

Chapter 3. Management Measures for a Sustainable Market Squid Fishery

3.1 Proposed Project Objectives

The Marine Life Management Act (MLMA) sets sustainability as an overall goal for the fishery management system (FGC §7056). Within the definition of sustainability, the MLMA includes not only the maintenance of the fishery populations, but also the fullest possible range of present and long-term benefits, ecological benefits, and biological diversity (FGC §99.5). The MLMA calls for achieving its primary goal of sustainability by meeting several objectives:

- preventing overfishing;
- rebuilding depressed stocks;
- ensuring conservation; and
- promoting habitat protection and restoration.

To this end, fishery management plans (FMPs) must identify measures that will be used for the conservation and management of the fishery (FGC §7082). Among other measures, the MLMA mentions area and time closures, size limits, gear restrictions, and restricted access. The Department proposes to meet these requirements and the goals and objectives of the Market Squid Fishery Management Plan (MSFMP) by recommending management based on four components: 1) fishery control rules, 2) harvest replenishment areas, 3) restricted access and 4) ecological concerns. The proposed project and alternative options are grouped around these components. The proposed options protect the market squid resource by minimizing the risk of overfishing, adverse social and economic impacts on the fishing communities whenever possible and ecological impacts that result from the commercial squid fishery; together these options form an integral approach to meeting the MLMA guidelines.

This MSFMP establishes a fisheries management program for market squid and procedures by which the Commission will manage the market squid resource and various fishery components. In addition, it sets the limits of management authority for the Commission when acting under the MSFMP. Management measures implementing the MSFMP, which directly control fishing activities, must be consistent with the goals and objectives of the MSFMP, MLMA and other applicable laws. These management actions are to be considered regularly with an exception that provides for more timely Commission action under certain specific conditions. Procedures in this FMP do not affect the authority of the Director of the Department of Fish and Game to take emergency regulatory action under FGC §7710.

The Department's Proposed Project (Table 3-1), the "No Project" alternative (Table 3-2) and other alternatives (Table 3-3) were evaluated for management of the market squid fishery based on the four components (1) fishery control rule; 2) harvest replenishment areas; 3) restricted access and 4) other concerns).

3.1.1 Fishery Control Rule

The fishery control rule provides a protocol for determining sustainable levels of market squid fishing that is enforced through the adoption of specific management tools such as seasonal catch limits, daily trip limits, area closures, time closures and sustainable levels of egg escapement. Information regarding the biology of market squid is limited and no reliable estimate of market squid abundance is available. As knowledge increases, management can adapt. In addition, the MSFMP recognizes there are geographical differences in the market squid life history and fishery. The management alternatives proposed by the Department have considered the conditions specific to each region (north and south of Point Conception).

3.1.2 Harvest Replenishment Areas

The MSFMP is consistent with the mandate of the Marine Life Protection Act (MLPA) to design a Master Plan for MPAs in California for protection of habitat and ecosystem integrity as well as sustainable fisheries. Some of these areas can serve as harvest replenishment areas for market squid. Further, the market squid resource is a significant forage component in the diets of seabirds, marine mammals and fish and these MPAs can also provide forage reserves for these species.

3.1.3 Restricted Access

The MSFMP bases its approach to restricted access upon the Commission's restricted access policy, and presents a capacity goal, initial issuance criteria and transferability options for the commercial market squid fishery.

3.1.4 Other Concerns

The market squid fishery is part of a larger ecosystem that includes the effects of ecological interactions of the project on nontarget species and habitat. Information on environmental factors is presented to ensure the consideration of how this project affects other resources.

Finally, effective implementation of the MSFMP measures will benefit from being in compliance with the federal CPS FMP. Taken together, these measures are consistent with the goals and objectives of the MLMA and the MSFMP.

3.1.5 Proposed Project

Table 3-1. Summary of Impacts for Market Squid FMP Preferred Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
Option / Alternative		Environmental effects	Social and economic effects
Preferred Option			
A. Seasonal Statewide Catch Limitation			
A.2	Establish a seasonal catch limitation of 118,000 tons based on average catch for the last three seasons	A "risk-averse" approach to sustain long-term abundance levels, considered precautionary management	No change in producer and consumer surplus, no change in fishing community economic activity
B. Monitoring the Fishery using an Egg Escapement Method			
B.1	Monitor the fishery through the egg escapement method while pursuing a biomass estimate of market squid at an egg escapement threshold level required in the CPS FMP	A "risk-averse" approach to sustain long-term abundance levels, considered precautionary management	No change in producer and consumer surplus, no change in fishing community economic activity
C. Daily Trip Limit for Market Squid Vessels and Brail Vessels			
C.2	Do not establish daily trip limits	A "risk neutral" approach as long as restricted access, weekend closures and a seasonal catch limit programs are adopted	No change in producer and consumer surplus, no change in fishing community economic activity
D. Weekend Closures			
D.1	Continue closures from noon Friday to noon Sunday from the U.S.-Mexico border to the California-Oregon border	A "risk-averse" approach to sustain long-term abundance levels, considered precautionary management	No change in producer and consumer surplus, no change in fishing community economic activity
E. Monitoring Program			
E.1	Continue existing squid monitoring programs (port sampling and logbooks)	A "risk-averse" approach to sustain long-term abundance levels, considered precautionary management	No change in producer and consumer surplus, no change in fishing community economic activity
F. Live Bait Fishery and Incidental Catch of Market Squid			
F.1	Continue existing regulations that do not require a squid permit when fishing for live bait or incidental take 2 tons or less	A "risk neutral" approach since live bait take and incidental catch landings are minimal	No change in producer and consumer surplus, no change in fishing community economic activity

Table 3-1. Summary of Impacts for Market Squid FMP Preferred Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
Option / Alternative		Environmental effects	Social and economic effects
Preferred Option			
G. Harvest Replenishment Areas			
G.1	Do not set aside specific areas as harvest replenishment areas for market squid	A "risk neutral" approach since MPAs established in the Channel Islands in addition to previously established reserves	No change in producer and consumer surplus, no change in fishing community economic activity
H. Market Squid Fleet Capacity Goal			
H.3	Establish a capacity goal for market squid vessels that produces a moderately productive and specialized fleet (52 vessels, 18 brail vessels and 34 light boats, capacity goal for non-transferable permits is zero)	A "risk neutral" approach as long as seasonal catch limit and weekend closure programs are adopted	Long-term: No change in producer and consumer surplus but has strong potential for increasing the economic activity of the overall fishing community
I. Initial Issuance of Permits			
I.1	Transferable permits: Market Squid Vessel Permit: possession of a current market squid vessel permit and a minimum number of landings in window period; Market Squid Brail Permit: possession of a current market squid vessel permit and a minimum number of landings in window period; Market Squid Light boat owner permit: possession of either a current market squid permit (vessel or light) and have submitted one light boat log by 12/31/00; Non-transferable: Market Squid Vessel Permit: have possessed a California commercial fishing license for at least 20 years and made at least 33 landings of market squid in any one permit year; Market Squid Brail Permit: possessed a California commercial fishing license for at least 20 years and made at least 10 landings of market squid with brail gear in any one permit year	None	Short term reduction in fishing community economic activity offset by development of a economic sustainable fishery for participants
J. Permit Fees			
J.1	Annual permit fee between \$400 and \$5000 for all squid fishery vessels regardless of type or transferability	None	Cost of permit; no change in fishing community economic activity

Table 3-1. Summary of Impacts for Market Squid FMP Preferred Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
Option / Alternative		Environmental effects	Social and economic effects
Preferred Option			
K. Market Squid Vessel Permit Transferability			
K.3	Establish full transferability of market squid vessel permits based on comparable capacity (within 10%); establish transferability of market squid vessel permits to a vessel of larger capacity under a "2 for 1" permit retirement; individuals wishing to gain entry into the fishery must secure two permits	None	Long term: increase in producer and consumer surplus; increased activity in market squid fishing community
L. Market Squid Brail Permit Transferability			
L.3	Establish full transferability of market squid brail permits based on comparable capacity	None	Long term: increase in producer and consumer surplus; increased activity in market squid fishing community
M. Market Squid Light boat owner permit Transferability			
M.3	Establish full transferability of light boat owner permits with a '2 for 1' permit retirement	None	Long term: increase in producer and consumer surplus; increased activity in market squid fishing community
N. Transferability Fee			
N.1	Between \$250 and \$1,000	None	Cost of permit; no change in fishing community economic activity
O. Gear Restriction			
O.1	Maintain existing gear options regarding shields and wattage (30,000 watts)	Risk-averse approach	None
P. Area and Time Closures to Address Seabird Issues			
P.4	Establish area and time closures restricting the use of attracting lights around Anacapa and Santa Barbara islands from February through September (one nm closure)	Risk-averse approach that offers protection to 12 nesting seabird species, including 1 endangered, 1 candidate and 3 SSC	None
Q. Market Squid Advisory Committee Options			
Q.1	Establish one advisory committee for the squid fishery, which includes scientific, environmental and industry representatives	None	Long-term: should benefit overall fishing community

3.1.6 No Project Alternatives

Table 3-2. Summary of Impacts for Market Squid FMP No Project Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
Options/Alternatives		Environmental effects	Social and economic effects
No Project Options			
A. Seasonal Statewide Catch Limitation			
A.5	Establish a seasonal catch limitation of 125,000 tons	A “risk-prone” approach to sustain long-term abundance levels because catch limit is set close to highest seasonal catch on record	No change in producer and consumer surplus, no change in fishing community economic activity
B. Monitoring the Fishery using an Egg Escapement Method			
B.1	Monitor the fishery through the egg escapement method while pursuing a biomass estimate of market squid at an egg escapement threshold level required in the CPS FMP	A “risk-averse” approach to sustain long-term abundance levels, considered precautionary management	No change in producer and consumer surplus, no change in fishing community economic activity
C. Daily Trip Limit for Market Squid Vessels and Brail Vessels			
C.2	Do not establish daily trip limits (same as proposed option)	A “risk neutral” approach as long as restricted access, weekend closures and a seasonal catch limit programs are adopted	No change in producer and consumer surplus, no change in fishing community economic activity
D. Weekend Closures			
D.1	Continue closures from noon Friday to noon Sunday from the U.S.-Mexico border to the California-Oregon border	A “risk-averse” approach to sustain long-term abundance levels, considered precautionary management	No change in producer and consumer surplus, no change in fishing community economic activity
E. Monitoring Program			
E.1	Continue existing squid monitoring programs (port sampling and logbooks)	A “risk-averse” approach to sustain long-term abundance levels, considered precautionary management	No change in producer and consumer surplus, no change in fishing community economic activity
F. Live Bait Fishery and Incidental Catch of Market Squid			
F.1	Continue existing regulations that do not require a squid permit when fishing for live bait or incidental take 2 tons or less (same as proposed option)	A “risk neutral” approach since live bait take and incidental catch landings are minimal	No change in producer and consumer surplus, no change in fishing community economic activity

Table 3-2. Summary of Impacts for Market Squid FMP No Project Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
Options/Alternatives		Environmental effects	Social and economic effects
No Project Options			
G. Harvest Replenishment Areas			
G.1	Do not set aside specific areas as harvest replenishment areas for market squid (same as proposed option)	A "risk neutral" approach since MPAs established in the Channel Islands in addition to previously established reserves	No change in producer and consumer surplus, no change in fishing community economic activity
H. Market Squid Fleet Capacity Goal			
H.5	Do not establish a capacity goal (no limited entry program)	None	Long-term economic viability of the fishery would be at risk
I. Initial Issuance of Permits			
I.2	Continue with existing moratorium program	None	Short term will have no change to producer and consumer surplus or fishing community economic activity; Long term potential to prevent economic sustainable fishery for participants
J. Permit Fees			
J.3	Maintain existing annual permit fee (\$400)	None	No change in fishing community economic activity
K. Market Squid Vessel Permit Transfer			
K.1	Do not allow permit transfers except in cases of major mechanical breakdown or loss of the vessel	None	Long term decrease in fishing community economic activity
L. Market Squid Brail Permit Transfer			
L.1	Do not allow permit transfers except in cases of major mechanical breakdown or loss of the vessel	None	Long term decrease in fishing community economic activity
M. Market Squid Light boat owner permit Transfer			
M.1	Do not allow permit transfers except in cases of major mechanical breakdown or loss of the vessel	None	Long term decrease in fishing community economic activity
N. Transferability Fee			
N.2	Continue the existing permit transfer fee of \$250	None	No change in fishing community economic activity
O. Gear Restriction			
O.1	Maintain existing gear options regarding shields and wattage (30,000 watts)	Risk-averse approach	None

Table 3-2. Summary of Impacts for Market Squid FMP No Project Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
<u>Options/Alternatives</u>		Environmental effects	Social and economic effects
No Project Options			
P. Area and Time Closures to Address Seabird Issue			
P.5	Do not establish area and time closures in regard to seabird issues	Risk-prone approach that may result in disturbance to 14 nesting seabird species, including 1 endangered, 1 candidate and 5 SSC	None
Q. Market Squid Advisory Committee Options			
Q.3	Do not establish an advisory committee for the squid fishery	None	None

3.1.7 Other Alternatives Considered

Table 3-3. Summary of Impacts for Market Squid FMP Other Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
Option / Alternative		Environmental effects	Social and economic effects
Other Alternatives			
A. Seasonal Statewide Catch Limitation			
A.1	Establish a seasonal catch limitation of based on previous landings of 80,000 tons based on 67% of average catch for the last three seasons	A “risk-averse” approach to sustain long-term abundance levels, considered precautionary management	Short-term: reduction in producer and consumer surplus, as well as likely decline in fishing community economic activity
A.3	Establish regional seasonal catch limitations based on a multi-year recent average catch for each region	A “risk-averse” approach to sustain long-term abundance levels, considered precautionary management	No change in producer and consumer surplus, no change in fishing community economic activity
A.4	Establish a seasonal catch limitation based on environmental conditions	A “risk-averse” approach to sustain long-term abundance levels, considered precautionary management, but difficult to forecast environmental conditions	No change in producer and consumer surplus, no change in fishing community economic activity
A.6	Do not set a seasonal catch limitation	A “risk-prone” approach that does not provide for sustainability of resource given that biomass estimate is lacking	No change in producer and consumer surplus, no change in fishing community economic activity
B. Monitoring the Fishery using an Egg Escapement Method			
	No additional alternatives proposed at this time	N/A	N/A
C. Daily Trip Limit for Market Squid Vessels and Brail Vessels			
C.1	Establish a daily trip limit between 30-137.8 tons daily for market squid vessels and 15 tons for brail vessels	A “risk-adverse” approach that in the short term would have no offer no additional benefit for the resource, considered precautionary management for the long term	Long term potential for decrease in producer and consumer surplus and decline in overall fishing community activity
D. Weekend Closures			
D.2	Do not continue weekend closures	A “risk prone” approach that could jeopardize the sustainability of the population – not considered precautionary management	Long-term potential for decrease in producer and consumer surplus as well as a decrease in the economic activity of the fishing community
E. Monitoring Program			
E.2	Do not continue existing squid monitoring programs	A “risk prone” approach that could jeopardize the sustainability of the population – not considered precautionary management	Long-term potential for decrease in producer and consumer surplus as well as a decrease in the economic activity of the fishing community
F. Live Bait Fishery and Incidental Catch of Market Squid			
F.2	Establish a permit for the taking of market squid as live bait	None	None

Table 3-3. Summary of Impacts for Market Squid FMP Other Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
Option / Alternative		Environmental effects	Social and economic effects
Other Alternatives			
G. Harvest Replenishment Areas			
G.2	Close all waters within depths of 100 fathoms around San Nicolas Island, an area where squid spawning occurs that is not regularly employed by fishermen	A "risk averse" approach that generally provides for sustainability of the resource, precautionary approach	None
H. Market Squid Fleet Capacity Goal			
H.1	Establish a capacity goal for market squid vessels that produces a highly productive and more specialized fleet (10 vessels and 10 light boats, 18 brail permits, capacity goal for non-transferable permits is zero)	A "risk neutral" approach as long as seasonal catch limit and weekend closure programs are adopted	Short term may negatively impact producer and consumer surplus as well as the economic activity of the overall fishing community
H.2	Establish a capacity goal for market squid vessels that produces a moderately productive and specialized fleet (52 vessels, 18 brail vessels and 52 light boats, capacity goal for non-transferable permits is zero)	A "risk neutral" approach as long as seasonal catch limit and weekend closure programs are adopted	Long-term: No change in producer and consumer surplus but has strong potential for increasing the economic activity of the overall fishing community
H.4	Establish a capacity goal for market squid vessels that produces a less productive and less specialized fleet (104 vessels and 104 light boats, 18 brail permits, capacity goal for non-transferable permits is zero)	A "risk neutral" approach as long as seasonal catch limit and weekend closure programs are adopted	Long-term: No change in producer and consumer surplus but has strong potential for decreasing the economic activity of the overall fishing community
I. Initial Issuance of Permits			
I.2	Continue with existing moratorium program	None	Short term will have no change to producer and consumer surplus or fishing community economic activity; Long term potential to prevent economic sustainable fishery for participants
I.3	Allow permit purchase by any permit holder who held a permit in the first year of the moratorium	None	Short term will have no increase producer and consumer surplus and fishing community economic activity; Long term potential to prevent economic sustainable fishery for participants

Table 3-3. Summary of Impacts for Market Squid FMP Other Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
Option / Alternative		Environmental effects	Social and economic effects
Other Alternatives			
I.4	Transferable permits: Market Squid Vessel Permit: possession of a current market squid vessel permit and a minimum of 50 landings during window period OR possession of a current market squid vessel permit, have possessed a California commercial fishing license for at least 20 years and made at least 33 landings of market squid in one permit year; Market Squid Brail Permit: possession of a current market squid vessel permit and made a minimum of 50 landings during window period OR have possessed a California commercial fishing license for at least 20 years and made at least 10 landings of market squid with brail gear in any one permit year; Market Squid Light boat owner permit: possession of either a current market squid permit and have submitted one light boat log by 12/31/00 OR possessed a California commercial fishing license for at least 20 years and have 33 days of participation in the squid light boat fishery in any one license year; there are no provisions for non-transferable market squid permits	None	Short term reduction in fishing community economic activity offset by development of a economic sustainable fishery for participants
I.5	Do not have a permit program	None	Long-term economic viability of the fishery would be at risk
J. Permit Fees			
J.2	Annual permit fee between \$400 and \$5000; fee may vary by type of squid fishery vessel and transferability of permit	None	Cost of permit; no change in fishing community economic activity
K. Market Squid Vessel Permit Transfer			
K.2	Establish full transferability of market squid vessel permits	None	Long term: increase in producer and consumer surplus; increased activity in market squid fishing community
L. Market Squid Brail Permit Transfer			
L.2	Establish full transferability of market squid brail permits	None	Long term: increase in producer and consumer surplus; increased activity in market squid fishing community
M. Market Squid Light boat owner permit Transfer			
M.2	Establish full transferability of light boat owner permits	None	Long term: increase in producer and consumer surplus; increased activity in market squid fishing community

Table 3-3. Summary of Impacts for Market Squid FMP Other Options. Options are evaluated in terms of the market squid fishery and its operations and relative to the status quo or no action. A complete evaluation of the impacts of each action is presented in detail later in this chapter.			
Option / Alternative		Environmental effects	Social and economic effects
Other Alternatives			
M.4	Trade '2-4 for 1' light boat owner permits for a brail permit	A "risk-averse" approach as the number of active light boats would decrease and likely reduce Light boat activity near nesting seabirds	Long term: increase in producer and consumer surplus; increased activity in market squid fishing community
N. Transferability Fee			
	No additional alternatives proposed at this time	N/A	N/A
O. Gear Restriction			
O.2	Remove existing gear options regarding shields and wattage	Risk-prone approach that may result in disturbance to coastal communities and nesting seabird species	No change in producer and consumer surplus, no change in fishing community economic activity
P. Area and Time Closures to Address Seabird Issue			
P.1	Establish area and time closure areas restricting squid fishing around Anacapa, Santa Barbara and San Miguel islands from 1 February through 30 September (one nm closure)	Risk-averse approach that offers protection to 14 nesting seabird species, including 1 endangered, 1 candidate and 5 SSC	None
P.2	Establish area and time closure areas restricting squid fishing around Anacapa and Santa Barbara islands from 1 February through 30 September (one nm closure)	Risk-averse approach that offers protection to 12 nesting seabird species, including 1 endangered, 1 candidate and 3 SSC	None
P.3	Establish area and time closure areas restricting the use of attracting lights around Anacapa, Santa Barbara and San Miguel islands from 1 February through 30 September (one nm closure)	Risk-averse approach that offers protection to 14 nesting seabird species, including 1 endangered, 1 candidate and 5 SSC	None
Q. Market Squid Advisory Committee Options			
Q.2	Maintain the two committee system: one from the scientific community and one from industry	Long-term: should benefit resource management	Long-term: should benefit overall fishing community

3.2 Fishery Control Rules

3.2.1 Definition of Maximum Sustainable Yield and Optimum Yield

The MLMA defines maximum sustainable yield (MSY) “the highest average yield over time that does not result in a continuing reduction in stock abundance, taking into account fluctuations in abundance and environmental variability” (FGC §96.5).

The MSY model determines catch limits, which most often are expressed as a fixed fishing rate such that a constant fraction of the stock may be harvested each year. It is specific for each species or stock of fish, and is calculated from knowledge of abundance, life history and population dynamics. Environmental factors are also considered since they affect growth, reproduction and mortality rates. In many cases, providing a range of estimates for MSY may be reasonable since there are different assumptions in the model. In addition, there may be situations where the scientific information is inadequate to directly calculate MSY for a particular species, and a proxy or substitute may be used. For example, recent average catch may be used as a proxy for MSY if a period is chosen when there is no evidence of a declining abundance.

Optimum yield (OY) is generally defined as the harvest level for a species that achieves the greatest overall benefits when considering biological, social and economic factors. Optimum yield differs from MSY because MSY only considers the biology of the species in question (Wallace et al. 1994).

The MLMA additionally defines OY to give specific direction for resource managers: “Optimum yield, with regard to a marine fishery, means the amount of fish taken in a fishery that does all of the following: (a) provides the greatest benefit to the people of California, particularly with respect to food production and recreational opportunities, and takes into account the protection of marine ecosystems; (b) is the maximum sustainable yield of the fishery, reduced by relevant economic, social or ecological factors; (c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing maximum sustainable yield in the fishery” (FGC §97).

It is not uncommon that the status of knowledge for a given stock is limited to the catch history and incomplete life history information. This fact is acknowledged by the Legislature in both the MLMA (see FGC §90.1, 7056(g), 7059, 7060, 7072(b), 7073(b) 7081) and in the squid statutes [see FGC § 8420(b), 8426(c)]. A precautionary approach to calculating OY in data-moderate or data-poor situations is to multiply MSY, or its proxy, by a fraction. A tenet of this principle is that less aggressive (more restrictive) harvest policies are adopted as uncertainty increases concerning the status of stocks and their response to fishing pressure (Restrepo et al. 1998). When information needed to calculate MSY is lacking, an alternative approach is to select a proxy.

3.2.2 Proxy for MSY and Precautionary OY

There often is insufficient knowledge to calculate MSY. Restrepo et al. (1998) provide an alternative approach for federal fisheries management, and the State used a variant of the Restrepo approach in the interim regulations for the market squid fishery.

A proxy for MSY is calculated when MSY-related parameters cannot be estimated from available data or when estimated values are deemed unreliable for various reasons (e.g., extremely low precision, insufficient contrast in the data, or inadequate models). The proxy for MSY in “data-poor” and “data-moderate” situations in this approach is based on the historical average catch, selecting a period when there is no indication that abundance is declining. A proxy for OY is then determined by reducing the proxy MSY by a percentage that can vary depending on the amount of information available. As uncertainty decreases about the status of stocks and their response to fishing pressure, less precautionary management can be adopted. This approach to risk management reduces the chance of inadvertent overfishing when little is known about the status of a stock.

There are no definitions or standards for measuring the level of data richness for a fishery other than the general guidance provided in Restrepo, et al. (1998):

- Data-rich cases: Reliable estimates of MSY-related quantities and current stock size are available. Stock assessments may be sophisticated, and provide a reasonably complete accounting of uncertainty.
- Data-moderate cases: Reliable estimates of MSY-related quantities are either unavailable or of limited use due to peculiar life history, poor data contrast, or high recruitment variability, but reliable estimates of current stock size and all critical life history (e.g., growth) and fishery (e.g., selectivity) parameters are available. Stock assessments may range from simple to sophisticated and uncertainty can be reasonably characterized and quantified.
- Data-poor cases: Reliable estimates of MSY-related quantities are unavailable, as are reliable estimates of either current stock size or certain critical life history or fishery parameters. Stock assessments are minimal, and measurements of uncertainty may be qualitative rather than quantitative.

It is important to remember these guidelines were established for fish that are considered long-lived in comparison with the market squid, which is an invertebrate.

3.2.3 Option A. Establish a Seasonal Catch Limitation

3.2.3.1 MSY Based on Historical Landings

Due to the lack of adequate data to make a mathematical MSY determination, guidance was taken from the NMFS (publication: Technical Guidelines on the Use of Precautionary Approaches to Implementing National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act (Restrepo et al. 1998). These guidelines propose that in data-poor situations such as the California market squid

fishery, a proxy may be used for MSY, and that it is reasonable to use recent average catch from a period when there is no qualitative or quantitative evidence of declining abundance.

El Niño events are a recurring phenomenon of the California Current and thus, are a factor in landings when considering MSY (see section 2.11 for definition). Historic market squid data indicate that low landing periods correspond with El Niño events when availability of squid to the fishery is greatly reduced. The market squid fishery is volatile and reliant on the international market and availability of squid from other fisheries. In the period between the last two El Niño events (1993-1994 and 1997-1998) there was a nearly unlimited demand for California market squid in the Republic of China, a situation that kindled rapid development of fishing and expansion of processing for export. The expansion ended with the onset of the 1997-1998 El Niño event during which market squid availability dropped to very low levels and landings declined.

The first fishing season (1999-2000) following the 1997-1998 El Niño event resulted in the highest squid landings on record (Table 3-4). Nearly all of the landings were from the southern California fishery (99.7%); landings reported from the northern fishery were minimal (0.3%). This disparity could not have been predicted given the current understanding of market squid or by utilizing temperature inclusive models. Average landings for the last ten, five and three years are presented in Table 3-5.

Season	Northern fishery	Southern fishery	Total landings
1991-1992	9,013	29,653	38,666
1992-1993 El Niño	9,450	9,343	18,793
1993-1994	10,012	44,440	54,452
1994-1995	19,103	44,489	63,592
1995-1996	3,676	90,157	93,833
1996-1997	5,828	118,481	124,309
1997-1998 El Niño	9,275	1,623	10,898
1998-1999 El Niño	26	11,673	11,699
1999-2000	308	126,464	126,772
2000-2001	7,730	115,681	123,411
2001-2002	10,094	92,621	102,715
2002-2003* El Niño	27,803	19,000	46,803

* 2002-2003 data are preliminary only

Average Catch** (tons)		Seasons	Above B_{MSY}	Above MSST/ Below B_{MSY}	Below MSST
10 years	73,047	1993-1994 to 2002-2003	73,047	48,941	24,106
5 years	75,099	1998-1999 to 2002-2003	75,099	50,316	24,783
3 years	117,633	2000-2001 to 2002-2003	117,633	78,814	38,819

* B_{MSY} = average spawning biomass; MSST = minimum stock size threshold.

**averages based on most recent years.

3.2.3.2 Options for Establishing a Seasonal Catch Limitation

Option A.1: Establish a statewide seasonal catch limitation of 80,000 tons. This seasonal catch limitation is based on the seasonal catch limitation using three-year recent average catch (Table 3-5) with the assumption that the stock is below B_{MSY} (average spawning biomass) and above MSST (minimum stock size). This approach uses a multiplier of 0.67. Under this option, a maximum statewide seasonal catch limitation of 80,000 tons would be implemented.

Option A.2 (Proposed action): Establish a statewide seasonal catch limitation of 118,000 tons. This seasonal catch limitation is based on the three-year recent average catch (Table 3-5) and the assumption that the stock is above B_{MSY} . This approach uses a multiplier of 1.0. Under Option A.2, a maximum seasonal catch limitation of 118,000 would be implemented.

Option A.3: Establish regional seasonal catch limitations based on a multi-year recent average catch for each region (Table 3-6) with the assumption that the stock is above B_{MSY} . The regions would be north and south of Point Conception.

Table 3-6. Landings limits based on B_{MSY} limit control rule by region*.			
Number of recent-years	Seasons	Northern region	Southern region
10 years	1993-1994 to 2002-2003	7,550	65,497
5 years	1998-1999 to 2002-2003	5,487	69,612
3 years	2000-2001 to 2002-2003	6,044	111,589

* B_{MSY} = average spawning biomass.

Option A.4: Establish a statewide seasonal catch limitation based on environmental conditions as recommended by the SRSC: A seasonal harvest of 115,000 tons in a non-El Niño period and a landings cap of 11,000 tons during an El Niño period.

Option A.5 (Status quo): Establish a seasonal catch limitation of 125,000 tons, a value in close proximity to the highest catch on record.

Option A.6: Do not set a seasonal catch limitation.

3.2.3.3 Analysis of Option A

Resource Impact

The ability of the California market squid fishery to support landings of greater than 100,000 tons in the 1999-2000 season with repeat landings of the same magnitude in the following two seasons suggests that the stock is robust enough to withstand these levels of landings. This is likely due to the semiannual lifespan and the presence of several (minimum seven) cohorts throughout the year.

Restrepo et al (1998) guidelines are standards for fish rather than invertebrates. The guidelines are designed for fishes whose lifespan is greater than one year. The short

lifespan of market squid (approximately six months) coupled with the existence of multiple cohorts within a year intimates that the spawning biomass undergoes continuous recruitment and a default control rule of 1.0 (Option A.2) rather than a lower value (0.67; Option A.1) is most likely appropriate for this species.

Establishing separate regional catch limits (Option A.3) is not warranted at this time for two reasons. First, the smaller fishery in the northern region is not preempted by the catch in the southern region. The northern fishery typically harvests squid from April through September while the southern fishery does not begin catching squid until October. Because the squid season begins 1 April, the northern (smaller) fishery would not be impacted by a statewide quota. The second reason not to establish regional catch limits is that, from a biological perspective, squid harvested in the northern and southern fisheries are identical. The lengths, weights and sex ratios are similar between regions. Although spawning peaks at different times of the year for these regions, the temperature and depth of egg deposition is comparable between regions. If additional biological evidence indicates that there are two distinct biological stocks of squid, regional landings catch limits should be revisited.

The option (Option A.4) to base the catch limit on environmental conditions (i.e., El Niño) seems like an ideal method to prevent overfishing when squid abundance is unknown. However, El Niño events are a highly variable phenomenon. These events last from 12-18 months and the time between events ranges from two to seven years. Finally, the strength of the warming events varies greatly from event to event. Limiting the fishery based on an unpredictable phenomenon would likely have no impact on the resource because of the low availability of squid.

Option A.5 establishes a seasonal catch limitation at a value in close proximity to the highest catch on record. This catch limit was set by the Commission for the market squid fishery in 2000 for the purpose of curtailing growth of the fishery should market demand allow for such expansion. Although there is little information to indicate whether the fishery is or is not sustainable at the high catch levels experienced since the mid 1990s, as a precautionary measure, it is prudent not to allow landings to expand beyond present levels without better methods to assess the status of the resource. Given the number of currently permitted squid vessels and significant excess capacity in the fleet, dramatic increases in catch could occur in a short time frame unless a safeguard is in place.

The option not to establish a seasonal catch limit (Option A.6) would be risk-prone because of the inadequate estimate of squid biomass. Although the SFAC did not support any landings limit and most fishermen and processors opposed the landings limit, a precautionary approach is reasonable. There was speculation that the likelihood of repeating a catch of 125,000 tons in a season was unlikely given the implementation of weekend closures. However, a La Niña event during the 1999-2000 season led to record landings of 126,772 tons, which has not been repeated.

Social and Economic Impacts

A maximum seasonal catch limitation of 80,000 tons (Option A.1) is likely to cause significant economic impacts to businesses as this value reflects a decline of 32% as compared with the last three years of the fishery. Further, it precludes future economic gain, which could be realized with opportunities for expansion to other markets. Because the northern fishery precedes the southern fishery, any economic impacts would be assumed mainly by the southern fishery.

A maximum seasonal catch limitation of 118,000 tons (Option A.2) is not likely to cause significant economic impacts to businesses as this is an average of recent historical catch and is less than 7% lower than the highest seasonal catch on record (1999-2000, 126,772 tons). In addition, this seasonal catch limitation (118,000 tons) is a value consistent with recent landings. However, it does limit future economic gain, which could be realized with opportunities for expansion to other markets.

Establishing regional catch limits might lead to regional impacts. Since the northern fishery takes place first, this region might be favored at the expense of the southern region. However, there is no historical evidence to suggest this might occur. The 2002-2003 season had record landings for the northern region; however, landings did not affect the southern fishery because it was experiencing a mild to moderate El Niño event (NOAA, 2003). Another consideration is that regional catch limits are not likely to be filled in one of the regions while limiting catch in the other, leaving a portion of the catch limit unharvested.

Trying to predict environmental conditions is, at best, difficult (Option A.4). Modeling attempts to determine the effect of environmental conditions on squid availability and abundance have not been successful (Maxwell et al, 2001). It is likely that creating seasonal catch limits based on environmental conditions would result in loss of available catch because of a delay in an or a reduction in predicted El Niño strength.

A maximum seasonal catch limitation of 125,000 tons (Option A.5) would not cause significant economic impacts to businesses as this is the status quo. However, it does limit future economic gain, which could be realized with opportunities for expansion to other markets.

Not establishing a seasonal catch limit (Option A.6) would not have a significant economic impact on the squid fishery unless it led to an overfished condition.

Ecological Impacts

Establishing a seasonal catch limit (Options A.1, A.2, A.3 and A.4) would limit interaction of the squid fishery with marine mammals, seabirds and other marine species as compared with the status quo (Option A.5).

Not establishing a seasonal catch limit (Option A.6) might lead to increased fishing activity and thus, interactions with marine mammals, seabirds and other marine species. Further, it might result in an overfished condition that might reduce forage for these species.

3.2.3.4 Department Preferred Option

Option A.2 (Proposed action): Establish a seasonal catch limitation of 118,000 tons. This seasonal catch limitation is based on a three-year recent average catch (Table 3-2) and the assumption that the stock is above B_{MSY} .

The Department recommends establishing a statewide seasonal harvest guideline for the directed fishery of 118,000 tons (Option A.2). Because a stock biomass estimate is not available, historical landings data need to be used for setting a seasonal catch limit. This seasonal catch limitation is based on the three-year recent average catch (Table 6-2) and the assumption that the stock is above B_{MSY} . This approach uses a multiplier of 1.0. The short lifespan of market squid (approximately six months) coupled with the existence of multiple cohorts within a year intimates that the spawning biomass undergoes continuous recruitment and a default control rule of 1.0 (Option A.2) rather than a lower value (0.67; Option A.1) is most likely appropriate for this species.

The proposed action would serve to curtail growth of the fishery should market demand allow for such expansion. Although there is little information to indicate whether the fishery is or is not sustainable at the higher catch levels experienced since the mid-1990s, as a precautionary measure, it is prudent not to allow landings to expand beyond present levels without better methods to assess the status of the resource. Given the number of currently permitted squid vessels and significant excess capacity in the fleet, dramatic increases in catch could occur in a short time frame unless a safeguard is in place. Catch trends indicate that the market squid resource appears to be quite robust and is able to sustain the recent catch levels. Any seasonal catch limitation must be reviewed periodically by the Department. The Department further recommends that this option be applied to the fishery in conjunction with monitoring the fishery through the egg escapement method (Option B).

3.2.4 Option B. Egg Escapement Method to Monitor Squid Fishery

3.2.4.1 Background

Several international squid fisheries are managed by a process that allows a proportion of the population to escape in order to spawn and sustain the population for the following year. These escapement models require an accurate assessment of the population biomass and squid mortality, in addition to a measure of fishing pressure. To date, population modeling work has not been successful in estimating market squid biomass. However, an escapement model has been developed using “egg escapement.” Because market squid are harvested on their spawning grounds, it is critical that an adequate number of eggs are spawned prior to harvest. The egg escapement method (Amendment 10 of the Federal CPS FMP), establishes a threshold value of 0.3 (30%) be used initially, given: (1) a reproductive escapement threshold of roughly 0.4 (40%) has been used effectively in other squid fisheries (e.g., Falkland Islands fishery – keeping in mind that the Falkland Island fishery harvests primarily

juveniles using trawl gear); (2) not all of the squid spawning grounds off the California coast are subject to fishing pressure; (3) an existing weekend closure allows two days per week for spawning to occur uninterrupted (de facto spawning escapement of 29%); and (4) the daily mortality of females during spawning is likely quite high. The egg escapement model is only valid as long as the fishery continues to harvest spawning adults. In the event that the fishery modifies its target to result in an increased fishing pressure on juveniles, this model would be invalid.

The egg escapement method of regulating the fishery relies on the Department to monitor the squid fishery at an appropriate level. The Department currently collects a maximum of 25 samples of 30 squid each month from the major ports that land squid. Collections include data on length, weight, and sex, ovaries, muscle tissue, and statoliths for subsequent ageing of squid. The egg escapement model, as a proxy for MSY, is only a temporary measure until an acceptable biomass estimate can be determined for market squid. On the chance that a biomass estimate is never determined for market squid, agencies will continue to improve the egg escapement method (e.g., increasing sample sizes).

The egg escapement method will be used as a proxy for MSY/OY. The fishery for market squid occurs only on their spawning grounds; these squid die after spawning bouts of egg deposition, hence it is possible to calculate the fraction of the reproductive potential that escapes the fishery. The most precise method to estimate escapement would be to calculate the eggs removed by the fishery. This would require counting the number of eggs in the oviduct and ovary of females sampled from the catch and then subtracting this number from the number of eggs available before spawning. Since it takes at least four hours to count a single female's eggs, it would be impossible to directly estimate values in a timely fashion. Therefore, a model was developed to indirectly estimate reproductive potential (Macewicz et al. 2001b). Reproductive potential before spawning is estimated for female squid using three factors: the length of the squid (dorsal mantle length), gonad weight (ovary and oviduct) and a standardized punch of mantle tissue.

The egg escapement method can be used to evaluate the effects of fishing mortality on the spawning potential of the squid stock.

3.2.4.1.1 Overfishing Definition Based on Egg Escapement

Because no biomass estimate exists for market squid, it is not possible to define an overfished condition for this species. It is important to recognize that setting a MSY for market squid is impractical for the squid fishery because fishery and biological data are inadequate and landings are strongly influenced by market demand rather than effort. Instead, if a minimum threshold for egg escapement is not realized for two consecutive years, it can be considered a warning flag when tracking the status of the population that an overfished condition may exist, or that catches of squid exceed any specified allowable level. Overfishing is defined as harvests of squid are occurring at times when either the egg escapement threshold is not being met, or that catches are exceeding

specified allowable levels. These catches may not be sustainable.

To evaluate the rate of egg escapement in the fishery, a port sampling program must be in place to collect samples from the fishery (see Option E).

3.2.4.2 Options for Monitoring the Fishery using an Egg Escapement Method

Option B.1 (Proposed action): Monitor the fishery through the egg escapement method at an egg escapement threshold level required in the CPS FMP while pursuing a biomass estimate of market squid.

No other alternative options are being considered at this time.

3.2.4.3 Analysis of Option B

Resource Impact

The egg escapement method can be used to evaluate the effects of fishing pressure on the spawning potential of the stock. However, it is important to note that this approach does not provide estimates of historical or current total biomass and thus, a definitive yield (i.e., quota or Acceptable Biological Catch) cannot be determined at this time. Ultimately, the egg escapement approach can be used to assess whether the fleet is fishing above or below an *a priori*-determined sustainable level of exploitation and in this context, can be used as an effective management tool. The egg escapement method offers advantages for squid fishery management. First, it allows for “real-time” management of the fishery, without an unnecessarily large investment in personnel or regulations. Secondly, the method clarifies the role and importance of sample data on age, reproductive anatomy, and fishing effort, which collectively, allow researchers to conduct the most thorough assessment at this time. In summary, the current port sampling program can provide an objective method for establishing MSY-based management goals for the squid resource.

Social and Economic Impact

Option B.1 would most likely produce a reliable and stable MSY proxy/control rule that would allow for landings at or above their current levels. Compared to the status quo there would not be any significant changes in net economic benefits and fishing community economic activity if the MSY proxy is at current landing levels. If the MSY proxy is greater than current landings, then a proportionate increase in consumer and producer surplus and fishing community economic activity, above those anticipated under the status quo, is expected.

Ecological Impacts

There are not any expected ecological effects.

3.2.4.4 Department Preferred Option

The egg escapement method offers advantages for squid fishery management: 1) it allows for “real-time” management of the fishery And 2) the method clarifies the role and importance of collecting sample data on age, reproductive anatomy and fishing effort, which collectively, allow researchers to conduct the most thorough assessment at this time. In summary, the current Department port sampling program should provide an objective method for establishing MSY-based management goals for the squid resource. Furthermore, preliminary modeling indicates that the egg escapement method should allow for sustainability of the resource (Maxwell et al., 2001) and not have any significant impact on the resource. Although this is a theoretical model, it does evaluate fishery pressure on the spawning stock using current biological information for market squid.

Finally, it is important to mention that the egg escapement threshold was established assuming that the existing weekend closure (Option C.1), which allows two day per week for spawning to occur uninterrupted, remains in place.

3.2.5 Option C. Daily Trip Limit for Vessels Landings Squid

3.2.5.1 Background

There was a slight increase in the average daily landings of squid from 1981 to 1995, after which, the average daily landing seems to have become quite constant (fig. 3-1). A daily trip limit might be important because the fishery targets spawning squid and a reduced daily harvest could allow a proportion of spawning squid to continue spawning each day. Additionally, trip limits for market squid vessels might serve to protect the resource by distributing harvest throughout the season. Establishing daily trip limits for squid fishing vessels would prevent current vessels from increasing catch volume on a daily-per-trip basis when market-imposed trip limits are lifted or technological developments allow for increased efficiency. A trip is defined as any activity (e.g., catching, landing, transporting, or delivering) by a vessel that harvests squid with a squid permit (i.e., a possession limit that applies to harvesting operations only). Further, if transferability options are adopted, establishing a vessel possession limit might discourage entry of vessels of larger capacity than boats currently participating in the fishery. Specifically, this would deter transfer of permits to significantly larger vessels that could possibly eliminate market opportunities for several smaller, currently active boats. It would be another way of endorsing the current diverse size makeup of the fleet and maintaining some distribution of the squid catch between different vessels.

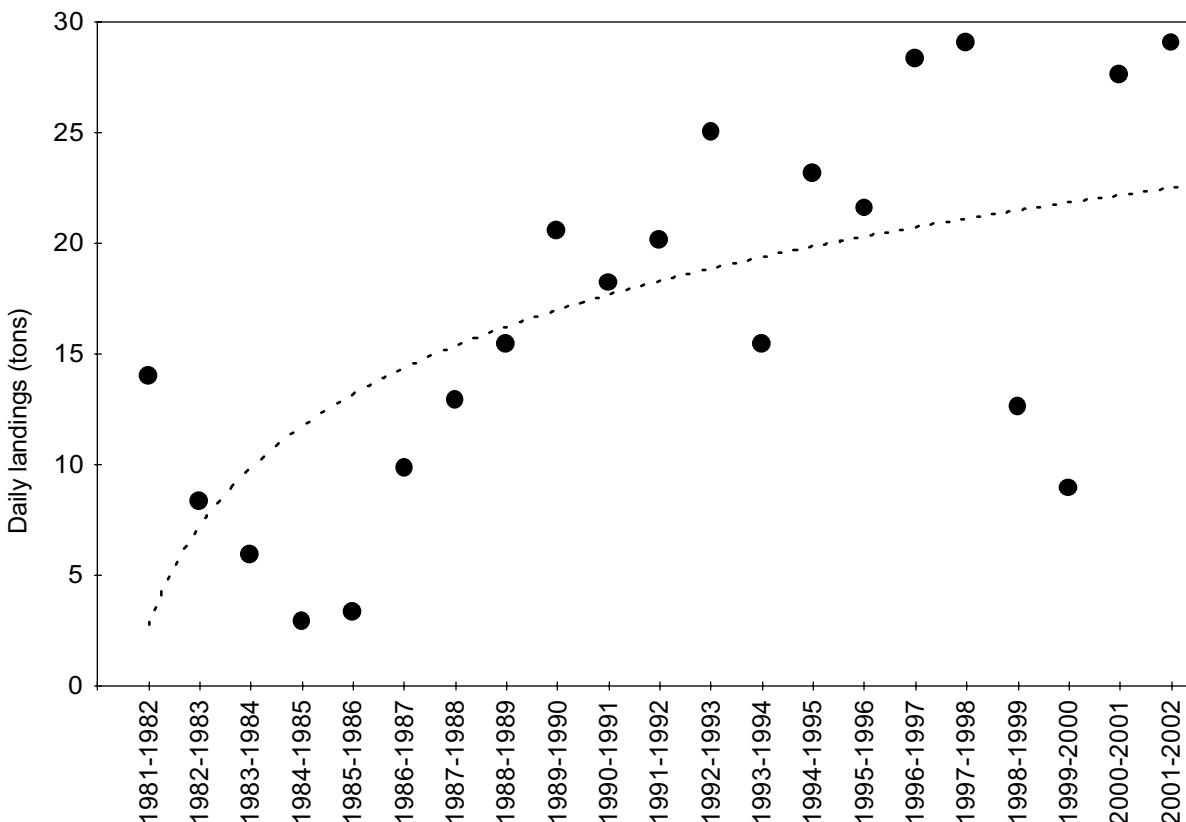


Figure 3-1. Average daily landings for market squid by season. Source: CDFG Landing Receipts.

From 1 January 1990 through 30 November 2002, daily landings were analyzed and the majority (70.1%) of landings were 30 tons or less (Table 3-7). Although vessels in the current fleet are capable of delivering loads well in excess of 60 tons, there is rarely the opportunity to deliver a vessel's full capacity because market-imposed trip limits of 30 tons are routine. Processors set the limit at 30 tons because of limited processing and freezing capacity. The CPS FMP federal guidelines limit CPS finfish harvest to approximately 137.8 tons (125-metric ton) daily trip limit, but landings of this magnitude are rare (fig. 3-2).

Tons landed (range)	Percent of landings
0 to 30	70.1
> 30 to 45	17.1
> 45 to 60	9.3
> 60 to 75	2.5
> 75 to 90	0.6
> 90	0.4

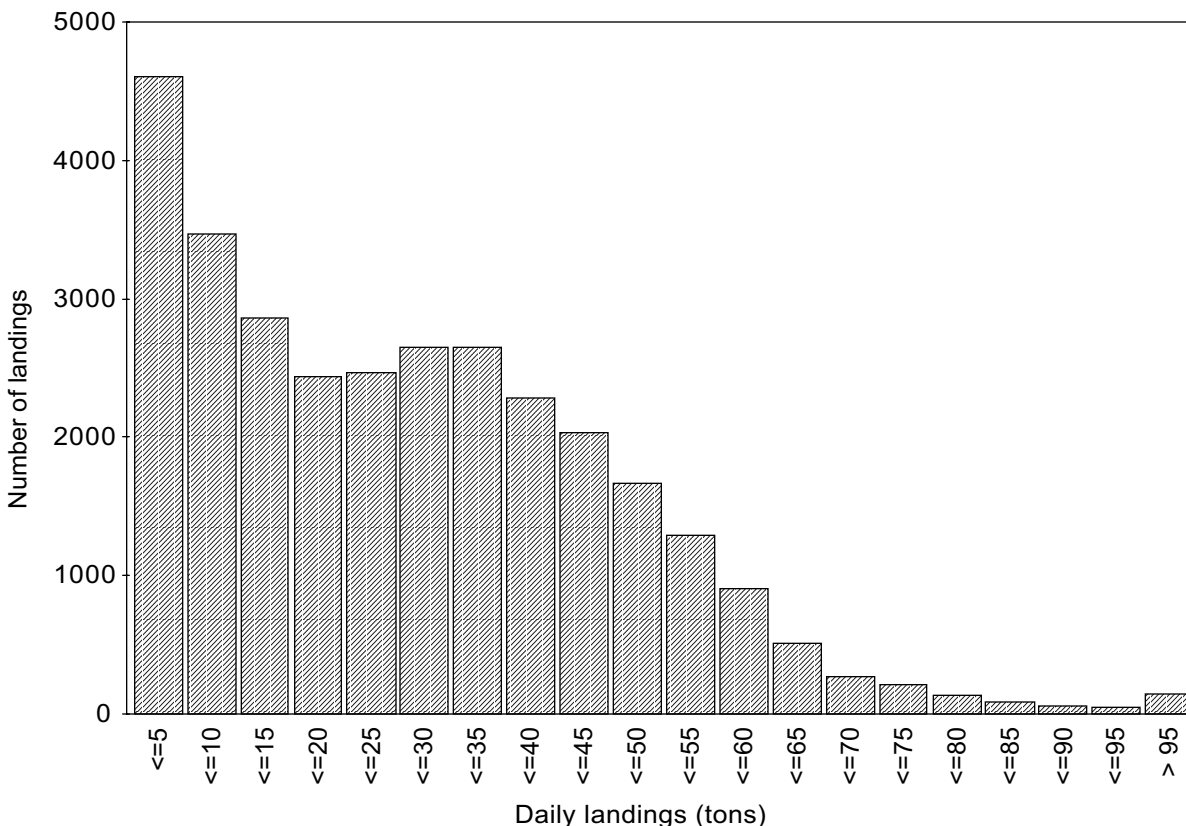


Figure 3-2. Daily market squid landings for currently permitted vessels from January 1, 1990 through 31 December 2002 excluding landing made with brail gear. Source: CDFG Landing Receipts.

Most brail vessels in the squid fleet have a hold capacity typically 15 tons or less. A separate trip limit based on historical catch information could be designated for these vessels. Establishing a trip limit for vessels issued a brail permit would prevent current brail vessels from increasing catch volume on a per-trip basis. Landing data indicate that 94.5% of brail landings were of 15 tons or less since 1990 (fig. 3-3). In view of the fact that this sector of the commercial squid fleet is small, it appears that brail landings are limited by market conditions, size of vessels and inefficiencies of fishing techniques.

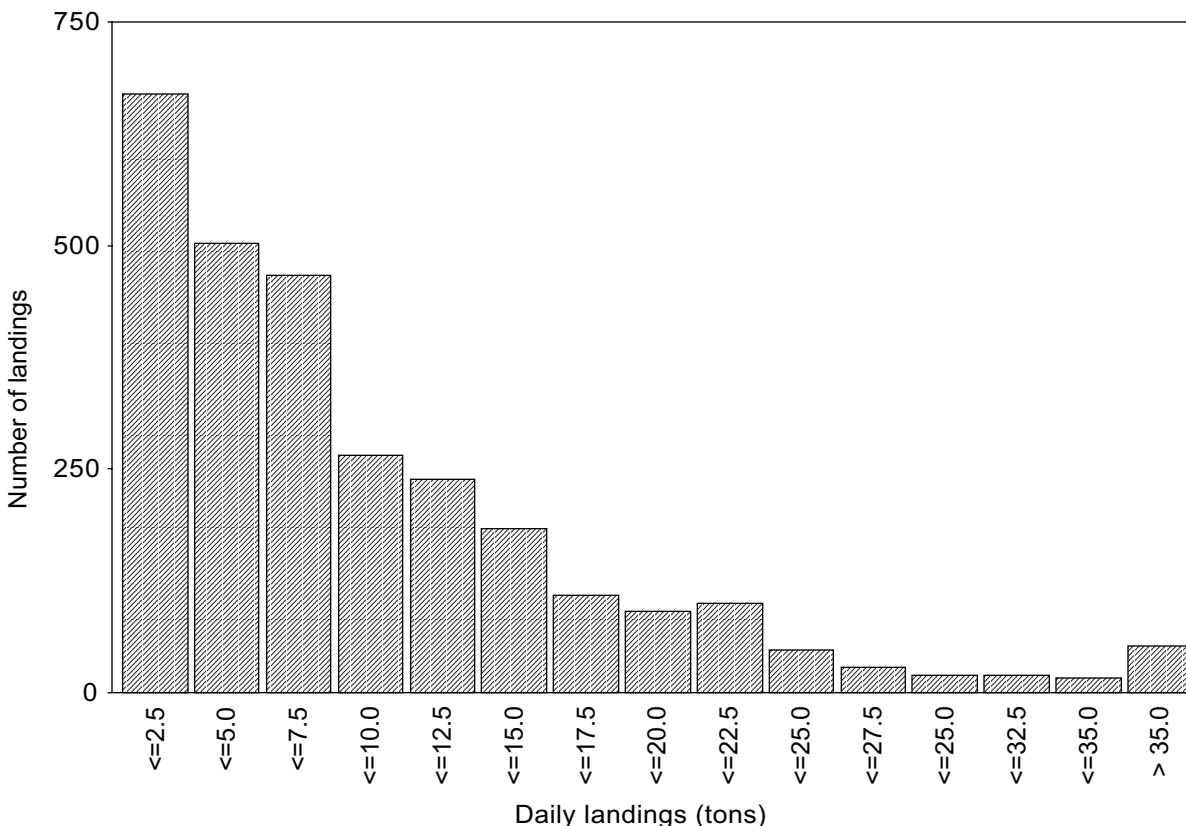


Figure 3-3. Daily market squid landings for currently permitted vessels using brail gear from 1 January 1990 through 31December 2002.

3.2.5.2 Options for Establishing a Daily Trip Limit

Option C.1: Establish a daily trip limit between 30 and 137.8 tons daily for market squid vessels and 15 tons for brail vessels.

Option C.2 (Proposed action – status quo): Do not establish daily trip limits for the market squid fishery.

3.2.5.3 Analysis of Option C

Resource Impact

The current fishery is subject to daily market orders, which usually approximate 30 tons. If daily trip limits are not established and market conditions changed, fishing effort could disproportionately target individual cohorts. No data are available to determine if this condition might actually occur and no biological data are available to determine the effects of increased pressure on certain cohorts. Further, it is believed that setting the squid daily trip limit to that for finfish in the federal CPS FMP (daily trip limit = 137.8 tons) would not be appropriate because so few landings (0.4%) were above this level.

Social or Economic Impact

The daily trip limit might have statewide significant economic impact on businesses not operating under market-imposed limits, but the degree of impact would depend on the daily trip limit set. Daily trip limits might require additional vessel days to obtain the seasonal catch limit that would result in additional overhead expense to the vessel owner (e.g., fuel, provisions). However, since the best estimates of vessel expenses are proportional to catch, these values are difficult to estimate.

From Department landing receipt records, 117 vessels have been identified as making at least one daily squid delivery in excess of 30 tons during the 1998-1999 to 2002-2003 seasons (note: 2002-2003 season data through 31 December 2002 only). The average maximum seasonal revenue loss for each of these vessels would be approximately \$35,800 (Table 3-8). Maximum estimated lost revenue for the market squid fleet could total close to \$4,200,000 (22.1% of revenue) per season if a 30 ton daily trip limit were established. The number of vessels and estimated maximum loss to each vessel declines as the daily trip limit increases. Since the 1998-1999 season, five vessels have made daily deliveries greater than 137.8 tons. The average maximum seasonal revenue loss for each of these vessels would be approximately \$1,008. Maximum estimated lost revenue for the market squid fleet could total close to \$3,025 (less than 0.02% of revenue) per season if a 137.8 ton daily trip limit were established. The number of vessels and estimated maximum loss to each vessel declines as the daily trip limit increases (see table 3-8 for values).

Table 3-8. Estimated revenue loss if daily trip limit established based on landings from the 1998-1999 season through 2002-2003 season (2002-2003 season through 31 December 2002 only). Note: dollars are adjusted for inflation the 2000 dollar value (source: US Bureau of Labor Statistics). Data Source: CDFG Landing Receipts.

Tonnage over proposed daily trip limit	Number of daily trips exceeding proposed daily trip limit	Number of vessels with landings exceeding proposed daily trip limit	Estimated maximum average seasonal loss per vessel	Fleet maximum estimated seasonal loss	Percent of total revenue (%)
>30	6100	117	\$35,761	\$4,183,999	22.1
>45	2556	93	\$14,832	\$1,379,370	7.3
>60	673	55	\$7,947	\$437,077	2.3
>75	235	35	\$5,144	\$180,042	0.9
>90	107	20	\$3,910	\$78,193	0.4
>137.8	5	3	\$1,008	\$3,025	0.0

Department landing receipts show that seven brail or scoop vessels made at least one squid delivery in excess of 15 tons since the 1998-1999 season (Table 3-9). Average seasonal loss in revenue for each of these vessels would be approximately \$9,602.31. A brail vessel possession limit of 15 tons could cause a maximum estimated seasonal loss of \$13,443 in revenue to the brail fleet, but is likely to be significantly less.

Any economic impact to processors is believed to be negated by other landings.

Table 3-9. Estimated revenue loss if daily trip limit established for brail gear based on landings from the 1998-1999 season through 2002-2003 season (2002-2003 season through 31 December 2002 only). Note: dollars are adjusted for inflation the 2000 dollar value (source: US Bureau of Labor Statistics), Data Source: CDFG Landing Receipts.

Season	Number of daily trips exceeding proposed daily trip limit	Number of vessels with landings exceeding proposed daily trip limit	Estimated maximum average seasonal loss per vessel	Fleet maximum estimated seasonal loss
1998-1999	1	1	\$1,154	\$1,154
1999-2000	14	2	\$11,889	\$23,777
2000-2001	24	4	\$6,604	\$26,416
2001-2002	8	5	\$3,174	\$15,868
2002-2003	0	0	\$0	\$0
Total	47	7	\$9,602	\$67,215

The no daily trip limit alternative (Option C.2) would not have any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

There are not any expected other ecological effects.

3.2.5.4 Department Preferred Option

The proposed project does not establish trip limits for market squid vessels or brail vessels. A seasonal catch limit (Option A.2) in combination with weekend closures (Option D.1) and a restricted access program (Option H.2) should serve to spread out the fishing effort on specific spawning aggregations and locations, minimizing impacts to the resource. Currently, the majority of daily landings are limited by market orders, however, if either market squid vessels or brail vessels improve their harvesting capability using enhanced technology or other means, this option should be reviewed.

3.2.6 Option D. Weekend Closure for Commercial Market Squid Fishery

3.2.6.1 Background

In 1984, the Commission established a regulation (14 CCR §149) to prohibit any vessel, using or possessing a roundhaul net in Districts 16 and 17, from taking market squid between noon Friday and midnight Sunday. Interim regulations (14 CCR §149) prohibit the take of market squid for commercial purposes each week between noon Friday and noon Sunday from Point Conception south to the U.S.-Mexico border. This closure is an extension of a pre-existing closure for the same time period north from Point Conception to the California-Oregon border (FGC §8420.5). The regulations affect vessels catching squid and vessels using lights to attract squid, and do not apply to those pursuing squid for live-bait purposes. This precautionary measure was adopted to provide spawning squid at least two consecutive nights each week respite from fishing pressure. Additionally, weekend closures prevent disturbance to spawning beds from fishing gear and allow total egg escapement during this period.

3.2.6.2 Options for Weekend Closure

Option D.1 (Proposed action – status quo): Continue closures beginning noon Friday through noon Sunday from the U.S.-Mexico border to the California-Oregon border.

Option D.2: Do not continue weekend closures.

3.2.6.3 Analysis of Option D

Resource Impacts

In the absence of conclusive biological information upon which to base a quota or other management approach, this weekend closure (Option D.1) allows for two days of uninterrupted spawning in areas where squid are being harvested. The weekend closure option is designed to allow a consecutive two-day reprieve from fishing pressure to allow uninterrupted spawning. Option D.1 would provide protection to the resource by allowing spawning to occur and egg cases deposited without disturbance from the fishery. Unlike a seasonal quota or closure, this measure spreads the spawning escapement throughout the year, rather than concentrating it during one particular period.

The weekend closure went into effect February 2000, near the end of the 1999-2000 season. The 1999-2000 season has the highest landings on record for California (126,772 tons). The following season had landings that were three percent less than the 1999-2000 season; this suggests that spawning squid can be allowed a consecutive two-day respite from fishing pressure without significantly impacting the fleet's total harvest capability.

Eliminating weekend closures (Option D.2) might increase fishing pressure disproportionately at various times during the season, but with a seasonal landing limit in place, would not increase total seasonal catch above that maximum take.

Social and Economic Impact

Weekend closures (Option D.1) are status quo for the market squid fishery. Weekend closures south of Point Conception went into effect February 2000. Although weekend closures effectively close 29% (2 out of 7 days) of fishing time and could have resulted in a loss of 29% of income, the closure does not appear to have limited the amount of squid landed. The following season had landings that were three percent less than the 1999-2000 season; this suggests that spawning squid can be allowed a consecutive two-day respite from fishing pressure without significantly impacting the fleet's total harvest capability, thus the fleet total social and economic capabilities. In 2000-2001 fishing season, 123,411 tons of market squid were landed, the third highest landings on record high.

Prohibiting fishing activity on weekends may also help alleviate conflict with other interest groups operating in the same areas. Compared to the status quo (Options D.1)

Option D.2 would not cause any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

Continuing closures (Option D.1), from noon Friday to noon Sunday from the U.S.-Mexico border to the California-Oregon border, will provide two-day and two-night respite weekly when the squid fishery is operating to the seabirds and marine mammals that might possibly interact with the squid fishery. The option to discontinue weekend closures (Option D.2) has the potential to increase squid fishery interactions with seabirds and marine mammals from the status quo by 40%. There are not any expected other ecological effects.

3.2.6.4 Department Preferred Option

The proposed project recommends continuing the existing weekend closures (Option D.1). In the absence of conclusive biological information upon which to base a quota or other management approach, a two-day per week closure allows for uninterrupted spawning in areas where squid are present. This measure spreads the egg escapement throughout the year, rather than concentrating it during one particular period. Additionally, prohibiting fishing activity on weekends may alleviate conflict with other interest groups operating in the same areas.

3.2.7 Option E. Monitoring Programs

3.2.7.1 Background

In 1998, fishery managers, researchers and statisticians from the Department and NOAA-NMFS met to develop both fishery-dependent and fishery-independent sampling and survey programs for market squid. During this meeting, goals were identified and a series of sampling protocols were developed to attain data necessary to expand our existing knowledge of basic market squid biology, life history and commercial fishing activity.

To acquire better information on squid taken in the California fishery, the Department developed and implemented a port sampling program to monitor biological variations of squid over the season in individual's length, weight, sex and maturity, as well as to accurately profile the state's commercial market squid fishery. Additionally, in 2000, a logbook program designed to collect information on effort in the fishery was implemented, where both light and roundhaul vessels provide information on their catch and effort during each day of fishing activity.

3.2.7.1.1 Market Squid Port Sampling Program

In May 2001, a Stock Assessment Review (STAR) panel was convened to evaluate methods used to assess the market squid stock. The STAR panel reached a consensus that the market squid fishery in California should be monitored through the

egg escapement method (Option B) while additional research is being conducted on squid abundance and biomass. In 2003, the CPS FMP Amendment 10 was approved which requires monitoring of the squid fishery through the egg escapement method. This method relies on data collected through the Department's port sampling program. The port sampling program provides an accurate profile of the state's commercial market squid fishery by sampling catch data on a daily basis.

3.2.7.1.2 Market Squid Logbook Program

Following recommendations from the SFAC and SRSC, the Department developed a logbook program, which became mandatory in February 2000. Both roundhaul and light vessels provide information on daily fishing activities. Information on fishing effort for the California's market squid fishery may be a critical factor used to model the squid population. To date, standard population models have not been successful for market squid (Maxwell, 2001). Information collected from roundhaul vessels includes set times, set locations, water temperature, net length, mesh size, what and role light boats played in the catch. The presence of birds and marine mammals during fishing operations is also recorded. Light boats are required to provide information on light wattage used, search time, searching equipment (i.e., sonar, echosound), and estimated tonnages of squid aggregated and estimated harvest by roundhaul vessels in each set.

Preliminary effort estimates have been generated from this source of information to date (Table 3-10, fig 3-4). Logbooks are one of the most important tools for fisheries managers and researchers. Logbook information on catch and fishing effort is used for research purposes. At the present time, they are the major source of data that will be used to refine the egg escapement model and assess fish stocks. Long-term use of logbooks will help identify fishing trends and assess the impact of management changes.

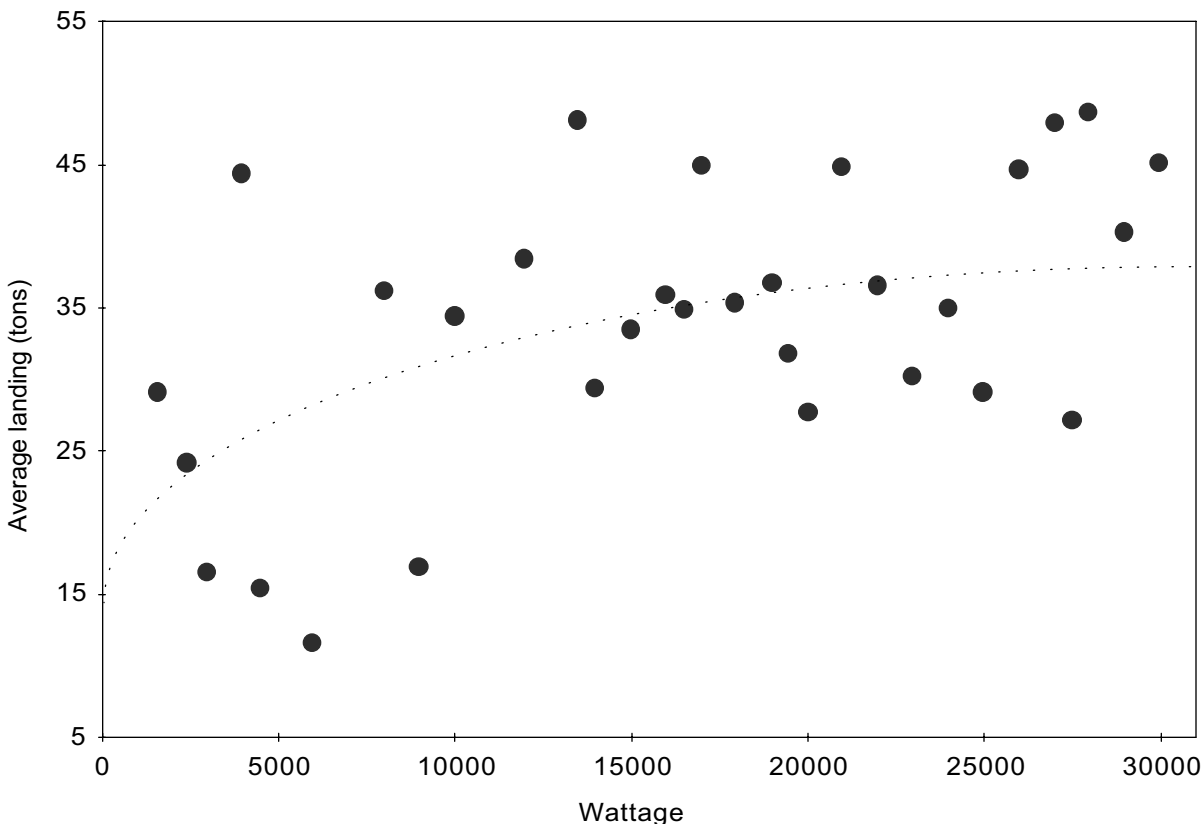


Figure 3-4. Average market squid landings by wattage used to light for squid from May 2000 through November 2002.

Table 3-10. Preliminary estimates of tons landed per hour lighting for squid. Note: only logbooks with completed entries were used (n=7019) Source: CDFG logbooks.			
Season	Northern fishery	Southern fishery	Statewide
2000-2001	20.8	56.5	53.4
2001-2002	12.9	50.1	44.3
2002-2003*	20.4	59.3	29.6

* Note: 2002-2003 data are not complete – data from 1 April 2002 through 31 December 2002 were used in analysis.

3.2.7.2 Options for Monitoring Program

Option E.1 (Proposed action – status quo): Continue existing squid monitoring programs, especially programs aimed at the development of management models including port sampling data and logbook information.

Option E.2: Do not continue existing squid monitoring programs.

3.2.7.3 Analysis of Option E

Resource Impacts

The monitoring programs (port sampling and logbooks) are designed to learn more about the fishery and resource and are intended to aid in the development of population models to sustain harvests. Options B.1 and B.2 (egg escapement method to monitor

the squid fishery) relies on the current port sampling program in place. Option E.1 does not have any expected effects on the squid resource.

Option E.2 would remove the existing monitoring programs and prevent evaluation of the rate of egg escapement for the market squid fishery as required by Amendment 10 of the CPS FMP. This option does not meet the goals of the MLMA and the MSFMP, and would likely have a negative impact on the squid resource.

Social and Economic Impact

Option E.1 and Option E.2 would not result in any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

There are no other expected ecological effects.

3.2.7.4 Department Preferred Option

The Department recommends continuing the existing squid monitoring programs, including fishery-dependent sampling efforts and ongoing monitoring of catch information, especially those focused on developing management models. The fishery-dependent sampling is essential for real-time monitoring of the market squid fishery through the egg escapement method. The proposed project maintains the Department's logbook system for squid vessels and light boats. These records provide valuable catch information other than landing data and may be critical to model the market squid population.

3.2.8 Option F. Live Bait Fishery and Incidental Catch of Market Squid

3.2.8.1 Background

Market squid are an important source of live bait for the California recreational fishing industry. A small volume is taken by the live bait industry using brail, lampara, or drum seine gear. This fishery is a high value use of squid, supplying bait to recreational fisheries along the West Coast, primarily in southern California. Live bait catch, largely dependent on local availability, is sold by vessels either at sea or at live bait dealerships in several harbors statewide. Since the sale of live bait in California is not documented in a manner similar to that used for the market landings of squid, estimates of tonnage and value are not available. Commercial passenger fishing vessels pay 15% of their gross receipts to the dealers that furnish their live bait, which includes squid (P. Strasser, pers. comm.).

FGC §8421(b) does not require vessels taking or landing market squid for commercial purposes to have a market squid permit if the catch does not exceed two tons in any calendar day. Because squid frequently school with CPS finfish, mixed landings of market squid and CPS finfish are common. With a seasonal catch limitation in place,

once the catch limit is reached, an allowance for incidental catch of market squid from other commercial fisheries is needed. This would prevent the squid being discarded.

Landings of market squid equal to two tons have been decreasing since the 1980s. For the last ten seasons, landings equal to or less than two tons averaged 0.5% of total landings (Table 3-11).

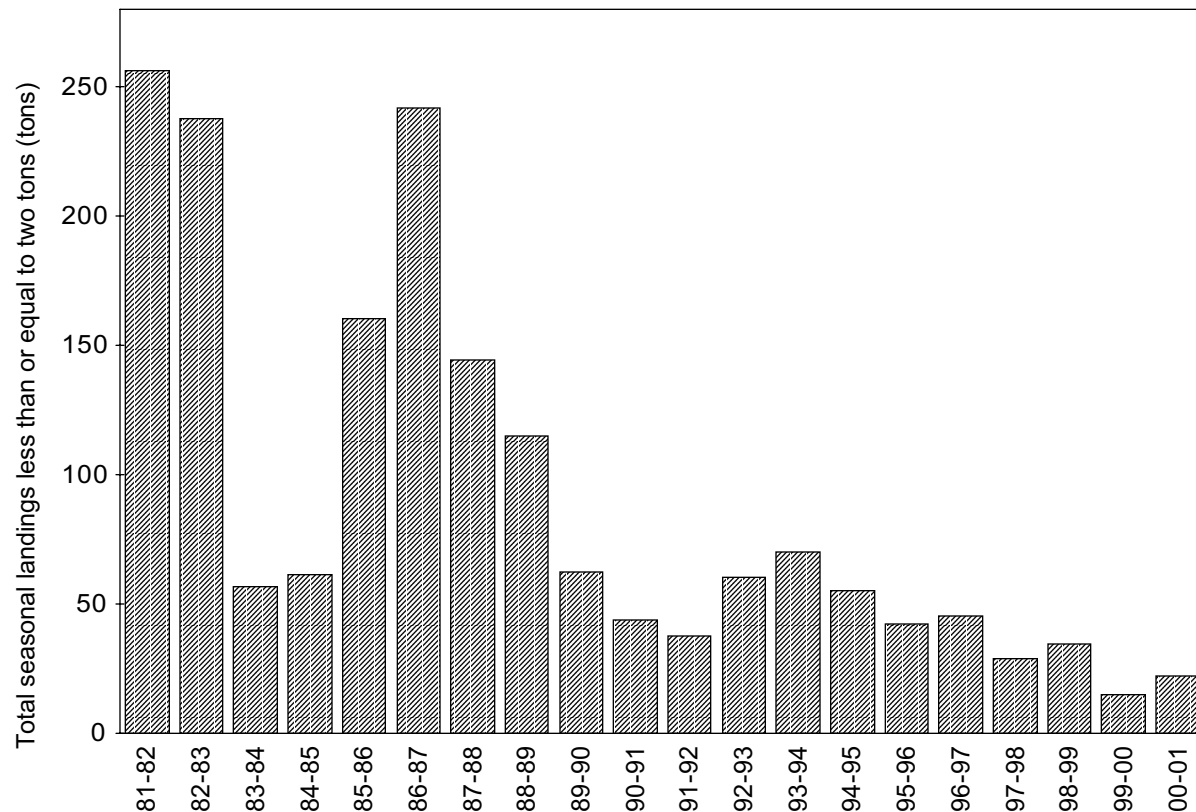


Figure 3-5. Market squid landings less than or equal to two tons by season. Source: CDFG Landing Receipts.

Table 3-11. Recent landings of market squid less than or equal to two tons by season. Source: CDFG Landing Receipts.

Season	Tons landed in a quantity of two tons or less	Percent of total landings
1992-1993	229.6	1.2
1993-1994	269.7	0.5
1994-1995	269.4	0.4
1995-1996	169.0	0.2
1996-1997	163.5	0.1
1997-1998	119.0	1.1
1998-1999	192.7	1.6
1999-2000	90.0	0.1
2000-2001	100.9	0.1
2001-2002	85.3	0.1
Seasonal average (last 10 seasons)	168.9	0.5

3.2.8.2 Options for Live Bait Fishery and Incidental Catch of Market Squid

Option F.1 (Proposed action – status quo): Continue existing regulations that do not require a squid permit when fishing for live bait. Continue existing regulations that do not require a market squid vessel permit for vessels landing or taking market squid not to exceed two tons in a calendar day.

Option F.2: Establish a permit for the taking of market squid as live bait. Continue existing regulations that do not require a market squid vessel permit for vessels landing or taking market squid not to exceed two tons in a calendar day.

3.2.8.3 Analysis of Option F

Resource Impacts

Option F.1 would continue the existing regulations that do not require a squid permit when fishing for live bait or when landing or taking market squid not to exceed two tons in any calendar day. Although the volume of squid taken as live bait is not quantified, it is believed to be small in relation to the overall fishery. This action maintains the status quo and is not expected to affect the squid resource.

Option F.2 would create a permit for the taking of market squid as live bait, but continue to allow landings equal to two tons or less to be landed without a permit. Creating a permit is not expected to have an impact on the quantity of market squid taken as live bait. This action is not expected to affect the squid resource.

Social and Economic Impact

The status quo (Option F.1) and Option F.2 are not expected to affect net economic benefits and fishery community economic activities.

Ecological Impacts

There are not any expected ecological effects.

3.2.8.4 Department Preferred Option

The Department recommends continuing the existing regulations that do not require a squid permit when fishing for live bait or when landing or taking market squid not to exceed two tons in any calendar day. The volume of squid taken in this manner is small; additionally, squid landed as live bait are highly valued by recreational fisheries along the West Coast, primarily in southern California. The actual amount of squid taken as live bait is unknown.

3.3 Harvest Replenishment Areas

3.3.1 Option G. Squid Harvest Replenishment Areas

3.3.1.1 Background

As part of the 1997 Legislation enacted to protect the market squid resource, the Department was directed to determine where there are areas, if any, that should be declared harvest replenishment areas for market squid where the taking of squid would not be permitted. Harvest replenishment areas are similar to Marine Protected Areas (MPA) and are a tool used to manage and conserve marine resources. They are sections of the ocean set aside to protect and restore habitats and ecosystems, conserve biological diversity and provide a refuge for sea life. These MPAs have multiple uses, including 1) providing a buffer for species against the effects of environmental fluctuations and management uncertainties, 2) protecting specific areas or species from overexploitation or 3) reducing user conflict.

In October 2002, the Commission designated 12 new MPAs at the northern Channel Islands (three of which replace existing reserves at Anacapa, Santa Barbara and San Miguel islands). These areas include known commercial squid fishing sites at Santa Barbara, Anacapa, Santa Cruz, and Santa Rosa islands. In addition to the closures at the Northern Channel Islands, commercial fishermen are not allowed to fish in state designated ecological reserves using roundhaul nets. Several existing reserves are known to be market squid spawning sites (e.g., Carmel Bay Ecological Reserve, Point Lobos Ecological Reserve, northeast side of Santa Catalina Island and Santa Monica Bay); all serve as harvest replenishment areas for market squid. Also, based on the large geographic range (Baja California north to Alaska) of market squid, there is an abundance of areas that are unfished for squid. The MPAs and ecological reserves and should be consider harvest replenishment areas for market squid. Harvest replenishment areas for market squid would serve to:

- Protect spawning habitat;
- Function as forage reserves;
- Offer protection against bycatch and fishery interactions; and
- Provide areas of uninterrupted spawning for market squid.

The market squid resource is important to the recreational fishery. Further market squid is a significant component in the diets of numerous seabirds, marine mammals and fish. The MPAs and ecological reserves will function as forage reserves for the many species that consume market squid.

3.3.1.2 Harvest Replenishment Area Options

Option G.1 (Proposed action – status quo): Do not set aside specific areas as harvest replenishment areas for market squid.

Option G.2: Close all waters within depths of 100 fathoms around San Nicolas Island.

3.3.1.3 Analysis of Option G

Resource Impact

Recognizing the value of all or some established MPAs as harvest replenishment areas for market squid will help to ensure protection of spawning habitat as well as promote a sustainable fishery. These MPAs should protect some fraction of target and bycatch populations.

Option G.1 does not create specific harvest replenishment areas for market squid and is not expected to affect the squid resource.

Option G.2 creates an harvest replenishment areas within depths of 100 fathoms of San Nicolas Island, a known squid spawning area that is not currently used by the squid fishery. Bottom terrain and weather conditions at San Nicolas Island are not favorable to squid fishing at this time, although technological advances within the fishery may change this situation. This option does not have any expected impact effects on the squid resource as these areas are essentially unfished for market squid. However, if these area were exploited in the future, this option could provide a benefit to the resource if squid continue to use the area.

Social and Economic Impact

Option G.1 (status quo) would not have any significant change in net economic benefits and fishery community economic activities.

Creating a harvest replenishment area within depths of 100 fathoms of San Nicolas Island (Option G.2), a known squid spawning area that is not currently used by the squid fishery would not have any significant change in net economic benefits and fishery community economic activities, but might have a future economic impact if there is a demand to fish these areas for squid.

Ecological Impacts

Option G.1 does not create specific harvest replenishment areas for market squid because there are federal and state MPA processes in progress that will function as harvest replenishment areas for market squid. This option does not have any expected effects on the squid resource.

The creation of additional harvest replenishment areas (Option G.2) should also create forage reserves for seabirds, marine mammals and other marine species that consume squid. These areas might serve to increase the amount of market squid available as prey to other species as compared to the status quo, although this is unlikely since these areas are essentially unfished for market squid. In addition, any possible seabird or marine mammal interactions with the fishery would not occur in these closed areas. However, exclusion of squid fishing in closed areas could shift fishing effort to areas with higher populations of seabirds or marine mammals, increasing the rate of squid fishery interaction with these other species. There are not any expected other ecological effects.

3.3.1.4 Department Preferred Option

The Department recommends not creating any specific closure areas for squid replenishment (Option G.1). At this time, given other MPA processes in progress at the state and federal level and considering existing “no fishing” areas and the abundance of unfished areas in California, the proposed project does not recommend any specific closure areas for squid replenishment. Further, the Department recommends continued evaluation and consideration of appropriate squid harvest replenishment areas, especially within any state and federal MPA processes.

3.4 Restricted Access - Limited Entry Program

3.4.1 Background

Restricted access programs are primarily designed to address economic issues associated with excess harvest capacity in open access fisheries. In a fishery such as the market squid commercial fishery, the main objective of a restricted access program would be to assure the greatest economic viability from the harvest of market squid.

Prior to the 1998-1999 season, the squid fishery was an open access fishery. In 1996, new demand and markets for squid attracted many fishing vessels from other states. This influx of fishing vessels and increased competition has resulted in conflict and territorial disputes between “local” and out-of-state fishermen.

Even when fishery management specifies catch limits, season length, and gear allowed, fishermen still compete to catch as much as possible in the shortest period of time. A restricted access program for the squid fishery should serve to balance the need to provide a viable economic harvest with the need to protect the squid resource. Access into the market squid fishery may be restricted by issuing only a certain number of permits (limited entry). Limited entry should alleviate some overcapitalization of the squid fishing fleet. In the absence of a biomass estimate for market squid, a limited entry program, in conjunction with a seasonal catch limit, monitoring the fishery through the egg escapement method and weekend closures should prevent an overfished condition from occurring because they collectively allow spawning to occur throughout the season.

A restricted access program for the market squid fishery should be designed to match the level of effort to the sustainability of the resource and promote conservation among participants as well as maintain the long-term economic viability of the fishery. Three major components of a limited entry program are identified and recommendations provided on a fleet capacity goal, initial issuance criteria, and guidelines for permit transferability.

3.4.2 Summary of Commission Policy and Guidelines

California's fisheries are to be protected, conserved and managed for the public benefit, which may include food production, commerce and trade, subsistence, cultural values, recreational opportunities, maintenance of viable ecosystems, and scientific research. None of these purposes need be mutually exclusive and, ideally, as many of these purposes should be encouraged as possible, consistent with resource conservation.

If harvest and other human-caused factors affecting the sustainability of the squid fishery are not managed, fishery resources may be less than optimally productive or, in the worst case, may suffer serious declines. Restricting access to a fishery has become one of many standard fishery management tools used by public agencies in carrying out their conservation and management responsibilities for publicly held fishery resources. It is the policy of the Department and Commission to design restricted access programs to enhance the State's ability to manage its commercial fishery resources. Restricted access programs should: 1) contribute to sustainable fisheries management by providing a means to match the level of effort in a fishery to the health of the fishery resource and by giving fishery participants a greater stake in maintaining sustainability; 2) provide a mechanism for funding fishery management, research, monitoring, and law enforcement activities; 3) provide long-term social and economic benefits to the State and fishery participants; and 4) broaden opportunities for the commercial fishing industry to share management responsibility with the Department.

More specifically, the Commission's purposes for restricting access or entry to a fishery are described as: 1) promote sustainable fisheries; 2) provide for an orderly fishery; 3) promote conservation among fishery participants; and 4) maintain the long-term economic viability of fisheries. Restricted access programs may be instituted in order to carry out one or more of these purposes in a given fishery.

Promote Sustainable Fisheries

Depending on the fishery, limiting the fishing capacity of the fishery by limiting the number of individual fishermen or vessels may be one means of reducing take in order to protect the fishery resource. In most instances, reducing the number of individuals or vessels alone will not in itself reduce take unless it is accompanied by complementary measures such as trip limits, quotas, seasons, or gear limitations. Together, restrictions on access coupled with other measures can be an effective way of controlling effort.

Provide for an Orderly Fishery

Extreme overcapitalization can lead to unsafe conditions as part of the competition among fishery participants, as in the case of "derby" fisheries. Properly designed restricted access programs can promote safety in those circumstances. Where fishing grounds are limited due either to geographical factors or fish congregating in small areas where harvest occurs, it may be necessary to limit the number of individuals or vessels involved in the fishery. The herring roe fishery is one example of where restricted access was established primarily for maintaining an orderly fishery.

Promote Conservation Among Fishery Participants

Limiting the number of individuals or vessels in a fishery can give those in the fishery a greater stake in the resource, a sense of ownership, and confidence that a long-term opportunity exists in the fishery that usually does not exist in open access fisheries. A well-designed restricted access program can give fishery participants greater incentive to be stewards of that resource and even to invest in rebuilding the fishery (the commercial salmon stamp program, for example). Limiting access can also increase compliance with fishery regulations since an individual with a restricted access permit is much less likely to risk losing the opportunity to participate in that fishery because of a fishery violation.

Maintain the Long-term Economic Viability of Fisheries

To assure the greatest economic benefit to society from the harvest of a public fishery resource, it may be necessary to limit the number of individuals or vessels to assure economically viable fishing operations. When open access contributes to the impoverishment of fishery participants or illegal or unsavory behavior by participants competing for the limited resource, some form of restricted access based on economic viability may be necessary. Any restricted access program established, entirely or in part, for the purpose of economic viability must be crafted to avoid restricting access more than is necessary.

Because a primary purpose of restricted access programs is to match the level of effort in a fishery to the health of the fishery resource, each restricted access program that is not based on individual transferable quotas shall identify a fishery capacity goal intended to promote resource sustainability and economic viability of the fishery. Fishery capacity goals can be expressed as some factor or combination of factors that fairly represents the fishing capacity of the fleet. These factors may include the number of permitted fishery participants, number of permitted boats, net tonnage of the permitted fleet, amount of gear used in the fishery, and cumulative hold capacity. Fishery capacity goals should be based on such biological and economic factors as what is known about the size and distribution of the target species, historic fleet size or harvest capacity, and distribution of harvest within the current fleet. Conflicts with other fisheries or ocean interest groups and economic conditions (current and future) within the fishery may also be factored in to such determinations. Depending on the fishery, the fishery capacity goal may be expressed as a single number or as a range.

Rationale for Implementation

Vessels currently participating in the market squid fishery are capable of harvesting more squid than is available under current or likely future biomass conditions. Fisheries characterized by excess harvesting capacity are described as overcapitalized in terms of the number of vessels and the amount of gear and equipment devoted to harvesting. As fisheries become overcapitalized, harvesting costs increase while catches remain the same. This situation represents an economically inefficient use of society's productive resources, and causes several problems for managers and the fishing industry when abundance and demand decline, and catches are reduced. As harvesting capacity in fisheries increases, problems arising from the need for more

restrictive management measures and resolution of allocation issues become more acute. No relief from these problems will occur if harvesting capacity continues to rise. Taking action to reduce excess capacity before a resource reaches depleted status is a proactive management strategy that may thwart or alleviate potential problems with resource allocation in the future.

Available information indicates that market squid vessels permitted in the 2000-2001 season could harvest in excess of 15,000 tons a day operating at maximum efficiency, an amount in excess of the volume of squid likely to be available under the most optimum of conditions. Additionally, many of the 185 current permitholders participate in the fishery at a minimal level (see Table 3-12). During the season with the highest volume of catch on record (1999-2000), 58 vessels accounted for 90 percent of the statewide catch landed by permitted vessels in the fishery. The remaining market squid vessels permitted that season represent a large capacity that is presently unutilized or underutilized.

Table 3-12. Percent of landings by currently permitted vessels (2002-2003 season) by season. Source: Source: CDFG Landing Receipts.			
Season	Total permitted vessels landing	Number of vessel landings 75% of total landings	Number of vessel landings 90% of total landings
1998-1999	115	27	43
1999-2000	167	39	58
2000-2001	152	40	58
2001-2002	119	32	48

Scope of Limited Entry

Vessels landing less than two tons of squid on a per trip basis will not be required to possess a limited entry permit. Additionally, landing of squid beyond the jurisdiction of the state of California will not be affected by any limited entry requirements.

Recreational fishing for squid will not require a limited entry permit, nor does fishing for squid for use as live bait.

3.4.3 Option H. Capacity Goal

3.4.3.1 Background

Evaluating the capacity of the current market squid fishery can be used to provide a basis for establishing a restricted access program that matches the level of effort in a fishery to the health of the fishery resource. The goal of such a program should be to maintain a sustainable squid resource and should provide for a fishery that is diverse, stable and profitable. With the establishment of the moratorium in 1998, many vessels applied for permits that were not previously active in the squid fishery. These purchases led to a situation where excessive and currently unutilized capacity is present among permitted vessels of the fleet. During peak landing periods, the number of active vessels was still significantly below the number of currently permitted vessels. No data exist that indicates that the squid resource is capable of sustaining harvests above the current level. Further, present market conditions do not indicate there is room for substantial increases in the number of vessels participating.

The maximum recorded number of days in a season (130 days, the highest value in Table C-13, column J) per vessel was selected as one option to evaluate maximum output per vessel by which overall fleet capacity may be estimated. However, the maximum average number of days squid were landed by a single permit holder in a season (45 days, the highest value in Table C-13, column K) may serve as the best estimate of the maximum effort expected to be exerted by the fleet overall. The impact of applying each of these effort values is reflected in the capacity options summarized in Table C-14.

Table 3-13. Summary of maximum and average seasonal vessel participation, 1981-2000 (Source: CDFG Landing Receipts.)											
Season	A	B	C	D	E	F	G	H	I	J	K
1980	5768.2	1619.9	0.281	55	11	433	97	17	8.8	17	8.5
1981	25851.3	11573.3	0.448	152	31	3581	1620	130	52.3	99	44.5
1982	13213.1	7204.1	0.545	125	26	2722	1276	118	49.1	86	37.9
1983	1087.1	741.3	0.682	81	17	423	170	36	10.0	28	8.8
1984	1353.5	478.6	0.354	95	22	469	176	27	8.0	20	6.5
1985	14375.5	9471.7	0.659	126	37	1793	985	118	26.6	65	21.1
1986	25602.5	20245.5	0.791	122	39	2409	1662	162	42.6	91	33.5
1987	25213.5	20892.3	0.829	117	38	1937	1428	116	37.6	86	30.8
1988	48195.2	36418.5	0.756	119	46	2594	1795	134	39.0	121	34.8
1989	33051.3	24702.3	0.747	100	42	2037	1417	141	33.7	89	29.7
1990	32472.2	27659.8	0.852	102	43	1829	1476	104	34.3	86	29.5
1991	38666.0	34395.5	0.890	85	44	1735	1502	103	34.1	96	30.4
1992	18793.4	16865.7	0.897	82	41	1394	1143	122	27.9	76	24.2
1993	54452.4	49254.1	0.905	92	49	2701	2333	175	47.6	107	40.9
1994	63591.6	58176.1	0.915	110	60	3486	3070	235	51.2	120	42.4
1995	93833.4	88056.0	0.938	127	73	4126	3718	269	50.9	114	40.0
1996	124309.3	114769.8	0.923	143	88	5081	4527	183	51.4	111	43.3
1997	10897.8	10743.6	0.986	86	50	909	778	57	15.6	51	14.8
1998	11698.7	11344.4	0.970	117	83	1345	1150	51	13.9	47	13.5
1999	125621.8	121562.5	0.968	168	105	4695	4449	138	42.4	130	41.3
2000	17100.9	17091.6	0.999	76	63	807	761	42	12.1	41	12.0

- A. Total statewide landings (ST)
- B. Landings (ST) made by current permitholders
- C. Percent of statewide landings made by permitholders (column B/A)
- D. Total number of vessels making landings
- E. Number of permitted vessels making landings
- F. Total number of landings made (includes incidental catch)
- G. Number of landings made by permitholders only
- H. Maximum landings by a single permitholder
- I. Mean number of landings made by a single permitholder
- J. Greatest number of days with landings by a single permitholder
- K. Mean days with landings by a single permitholder

Table 3-14. Market squid vessel capacity goal options		
	Number of days fished per season	
Description	130	45
Highly Productive and More Specialized- Assume the maximum catch that would ever be possible for each boat is caught on every trip.	10 vessels operating in this manner could land the maximum seasonal catch.	30 vessels operating in this manner could land the maximum seasonal catch.
Moderately Productive and Specialized - Assume the maximum catch that each boat has ever made is caught on every trip.	19 vessels operating in this manner could land the maximum seasonal catch.	52 vessels operating in this manner could land the maximum seasonal catch.
Less Productive and Less Specialized - Assume the average catch for each boat continues.	31 vessels operating in this manner could land the maximum seasonal catch.	104 vessels operating in this manner could land the maximum seasonal catch.

3.4.3.1.1 Market squid vessel capacity goal options

Several capacity goal options for the optimum number of market squid vessels are outlined in Table C-14, going from a highly productive and more specialized fleet which fishes squid more often to a less productive and more diversified fleet. Fewer boats will result in the fleet becoming more specialized, and these vessels will presumably need to be more productive for squid, resulting in a fleet with minimal excess or latent capacity. More boats will result in a fleet that is diversified to fish in other fisheries as well as squid, and some vessels of the fleet may fish less often for squid and be less productive. As a result, there may be excess and latent capacity that remains unutilized, and the fleet could be considered overcapitalized. Applying a maximum number of 130 fishing days implies vessels will be focused only on squid fishing activity at the expense of other fishing opportunities such as tuna or other coastal pelagic species, while 45 days of squid fishing reflects an average number of days of participation by the current active fleet prior to implementation of a limited entry program. Likewise, applying the maximum catch a vessel may theoretically ever make serves to generate an estimate of the maximum possible productivity in the fleet, while applying information on an individual vessel's maximum catch may yield a more realistic approach of how the fleet may be expected to perform.

3.4.3.1.2 Market squid light boat capacity goal options

Based on a long-term ratio of one light boat per roundhaul vessel during fishing activities, it would follow that the light boat capacity goal option should be consistent with the vessel capacity goal. As light boats do not land the catch, until implementation of the logbook program in 1999 it was virtually impossible to track light boat activity and vessel participation. Consequently, an assessment of light boat fleet capacity cannot be based on vessel-based performance of the fishery at this time, and the vessel capacity goal serves as a suitable proxy.

3.4.3.1.3 Market squid brail permit capacity goal options

Optimum brail vessel capacity is difficult to evaluate since it is a small component of the fishery. Because brail vessels function largely as light boats and the goal of the plan is to match the number of light boats to the number of market squid vessel permits, brail vessel permits should be part of the total light boat capacity goal.

3.4.3.2 Options for Market Squid Fleet Capacity Goal

Option H.1: Establish a capacity goal for market squid vessel permits that produces a highly productive and more specialized fleet. This option assumes that the maximum catch that would ever be possible for each boat is caught on every trip. If the vessel fished a maximum of 130 days per season, 10 vessels operating in this manner could land the maximum seasonal catch. This option would then set the capacity goal for both market squid vessel permits and market squid light boat owner permits at 10 permits each. The capacity goal for market squid brail permits would be 18 permits. The capacity goal for non-transferable market squid vessel permits and market squid brail permits is zero.

Option H.2 (Proposed action): Establish a capacity goal for market squid vessel permits that produces a moderately productive and specialized fleet. This option assumes that the maximum catch that each boat made is caught on every trip. If the vessel fished the highest average number of days per season (45), 52 vessels operating in this manner would land the maximum seasonal catch. This option would then set the capacity goal for both market squid vessel permits and market squid light boat owner permits at 52. The capacity goal for market squid brail permits would be 18 permits. The capacity goal for non-transferable market squid vessel permits and non-transferable market squid brail permits is zero.

Option H.3 (Proposed action): Establish a capacity goal for market squid vessel permits that produces a moderately productive and specialized fleet. This option assumes that the maximum catch that each boat made is caught on every trip. If the vessel fished the highest average number of day per season (45), 52 vessels operating in this manner would land the maximum seasonal catch. This option would then set the capacity goal for both market squid vessel permits and market squid light boat owner permits at 52. Because brail vessels function largely as light boats and the goal of the plan is to match the number of light boats to the number of market squid vessel permits, brail vessel permits would be part of the total light boat capacity goal of 52 vessels. The capacity goal for market squid brail permits would be set at 18 permits. The capacity goal for vessels operating solely as light boats would be 34. The capacity goal for non-transferable market squid vessel permits and non-transferable market squid brail permits is zero.

Option H.4: Establish a capacity goal for market squid vessels that produces a less productive and less specialized fleet, producing a more diverse fleet. This option assumes that the average catch for each boat continues. If the vessel fished a maximum of 45 days per season, 104 vessels operating in this manner would land the

maximum seasonal catch. This option would then set the capacity goal for both market squid vessel permits and market squid light boat owner permits at 104 permits. The capacity goal for market squid brail permits would be 18 permits. The capacity goal for non-transferable market squid vessel permits and market squid brail permits is zero.

Option H.5 (*Status quo*): Do not establish a capacity goal (no limited entry program).

3.4.3.3 Analysis of Option H

Resource Impact

The capacity goal options (Options H.1, H.2, H.3, H.4 and H.5) are not anticipated to have any unfavorable impact on the resource. The proposed project has a seasonal landings catch limit of 118,000 tons and monitoring the fishery through an egg escapement method. These management measures are designed to promote a sustainable fishery. A limited entry program combined with these management measures has social and economic impacts only and does not have any expected effects on the squid resource.

Social and Economic Impact

The capacity goal options (Options H.1, H.2, H.3 and H.4) were designed to provide for an orderly fishery and maintain the long-term economic viability of the fishery. At the current time, the market squid fishery has excess harvesting capacity that will lead to a decline in economic efficiency. While an optimal fleet size (Option H.1) would be very small compared with the status quo, the Department recognizes that a moderately productive and specialized fleet (Option H.2, H.3) would be less disruptive in terms of displacing vessels from the fishery and, thus, reduce impacts on fishing communities. On the other hand, a less productive and less specialized fleet (Option H.4) may not accomplish this goal. Option H.5 would not accomplish the goal to maintain the long-term economic viability of the fishery.

The moderate capacity goals (Option H.2, Option H.3) allows for some diversification in other fisheries such as sardine, tuna, and mackerel, while significantly reducing excess fleet capacity from vessels that are insignificant participants or have never been active in the squid fishery. This option allows for some amount of flexibility in activity should market conditions or availability of the resource change. The proposed project (Option H.3) sets the capacity goal at 52 vessels and 52 light boats based on the long-term ratio of 1:1 of roundhaul vessel to light boats during fishing activities. Because brail vessels function largely as light boats, brail vessel permits would be part of the total light boat capacity goal of 52 vessels. The capacity goal for market squid brail permits as a division of light boat owner permits would be set at 18 permits. The capacity goal for vessels operating solely as light boats would be 34.

Ecological Impacts

There are not any expected other ecological effects.

3.4.3.4 Department Preferred Option

The Department's preferred option (Option H.3) is to establish a capacity goal for market squid vessels that produces a moderately productive and specialized fleet. This option assumes that the maximum catch that each boat made is caught on every trip. If the vessel fished the highest average number of days per season (45), 52 vessels operating in this manner would land the maximum seasonal catch. This option would then set the capacity goal for light vessels at 52 light boats. The proposed project supports a brail fleet capacity goal of 18 vessels as part of the total light boat capacity goal of 52 vessels. The brail fleet produces only a small fraction of the overall take, but it is in the best interest of the fishery to curtail growth of this sector until more information is available by preventing an open-access situation.

3.4.4 Option I. Initial Issuance of Market Squid Fleet Permits

3.4.4.1 Background

Establishing limited entry qualifying criteria is a first step in reducing fleet size from the 184 squid vessels and 41 light boats currently permitted to achieve the selected capacity goal, provided the current number of vessels is in excess of the selected goal. Each option below provides different permitting strategies and results in a different number of vessels anticipated to qualify. Information for each option described below was prepared using catch information from the Department's commercial landings database as well as information on squid permit holders provided by the Department's License and Revenue Branch. All analyses are based on preliminary records and data, and are subject to change with subsequent revisions of these data sets.

Five major permit categories have been identified in developing options for initial issuance criteria: (1) transferable market squid vessel owner permits, (2) non-transferable market squid vessel owner permits, (3) transferable market squid brail permits, (4) non-transferable market squid brail permits, and (5) market squid light boat owner permits.

FGC §8101 permits any licensed fisherman to participate during the initial year of a limited entry program regardless of the prescribed conditions for entry if the fisherman presents to the Department satisfactory evidence that he or she has been licensed as a California commercial fisherman for at least 20 years and has participated in the specific fishery. Further, the fisherman must demonstrate qualifying participation in the fishery through landings or other appropriate criteria determined by the Commission. Based on analysis of landings information, current squid permittees that have actively participated in the squid fishery have done so by making an average of 33 landings per season from 1981 to 1999. This criteria is recommended to establish one season of participation in the squid fishery.

A capacity goal is a target value that may be disruptive if implemented immediately. Providing initial qualifying criteria, implementing provisions for permit transferability, and encouraging additional attrition (by possibly establishing substantial permit fees) are recommended mechanisms to help reduce the number of vessels in order to achieve the capacity goal in a less disruptive manner. It is important to note that capacity goals, initial issuance criteria options and transferability provisions must be considered in unison, as they are dependent upon one another.

SB 364 (Chaptered October, 1997) served as an initial notice of intent that a restricted access program was to be considered for the market squid fishery. This legislation established a squid fishery permit system; the system issued vessel-owner permits and permit renewal required possession of a permit the previous season (moratorium). This moratorium of squid permits further served to alert squid fishermen of the potential for a restricted access system.

The Commission's policy to determine qualification for an initial permit has three elements. First, the policy for all restricted access fisheries assumes that initiating a restricted access program will not increase the recent level of fishing effort. Second, initial issuance of permits will only be to the current owners of qualifying vessels. Third, in order to meet the needs of a particular fishery, it may be desirable to modify the approach of giving permits only to current owners of qualifying vessels.

California has had a practice of giving preference to vessels of fishermen with past participation when issuing restricted access permits. Among fishermen or vessels with past participation in the squid fishery, preference for permits may be based on factors such as years of participation in the fishery or level of participation (landings). Using landings as opposed to tonnage to qualify for initial issuance would be more equitable for the northern fishery, which generally lands significantly a smaller portion of the statewide harvest.

Developing light boat initial issuance criteria based on historical participation is particularly problematic given that light boat participation was not formally documented prior to the logbook program. When the permit program was initiated, light boats could possess either a market squid vessel permit or a squid light boat owner's permit to use attracting lights. A number of currently active light boats hold market squid vessel permits rather than light boat owner permits based on the design of the permit structure during the 1998-2000 moratorium period. Beginning in 2000, the Department has operated a market squid logbook program, which documents light boat activity. Using submitted logbooks as documented participation in the squid fishery could effectively eliminate a majority of vessels.

Under FGC §8101, several vessels may qualify for permits based on 1) having possessed a California commercial fishing license for at least 20 years and 2) have participated in the squid light boat fishery for at least one of those seasons. The Commission determines what qualifies as participation. It is not required under this

statute for the participant to have held a market squid vessel or light boat owner permit during the three-year moratorium period.

Recommended Permit Issuance Guidelines

- Each qualifying vessel owner will entitle the current owner to one limited entry permit.
- Vessel owners qualify for a limited entry permit by meeting the initial issuance criteria.
- A vessel owner cannot receive more than one limited entry permit.
- The vessel owner is responsible for maintaining the permit and any other documentation required on board each vessel with the permit to fish or light for squid.
- Limited entry permits will be registered for use with a vessel; the registered vessel may be changed only according to procedures outlined in regulation.
- A limited entry permit may not be used with a vessel unless it is registered for use with that vessel.
- Only entities (persons, corporations, etc.) qualified to own a U.S. fishing vessel may be issued or may hold a limited entry permit.
- Permits must be renewed annually by April 30 to avoid a late fee. If renewal does not occur by May 31, the permit is considered forfeited.
- A seasonal permit fee will be established which reflects the administrative costs of maintaining the limited entry program, as well as supporting fishery management, monitoring, research and enforcement.

SFAC Recommendations for Initial Issuance

On 12 November 1999, the Squid Fishery Advisory Committee (SFAC) discussed limited entry at length. They proposed a Control Date of 12 November 1999 to the Department for consideration of historical landings for initial permit issuance. This date is more than two years after the legislation was enacted which served as notice of intent for a restricted access program.

The SFAC voted to recommend the following permit issuance criteria for participation in the fishery:

- The participant must possess a valid permit to qualify;
- During the period of 01 January 1990 through 12 November 1999, market squid vessel permit holders must have made 50 landings;

The SFAC further recommended establishing a brail permit for vessels that made 10 landings during the period of 01 January 1990 through 12 November 1999 using brail gear. The Department agrees with the SFAC and recommends a control date of 12 November 1999, possession of a valid squid permit and a minimum of 50 landings to qualify for a transferable market squid vessel permit.

The SFAC did not recommend qualifying criteria for light vessels. Since many currently active light vessels hold market squid vessel permits rather than light boat owner permits, based on the design of the permit structure, the committee recommended that

vessels not qualifying for brail or vessel permits be provided the opportunity to purchase a market squid light boat owner permit the following year. The committee noted that they would like to establish limited entry criteria for the light boat fleet at some point in the future, but because there is no official proof of historic participation (since light vessels do not land squid, and therefore do not possess landing receipts) there was no adequate method by which to assess participation.

Using number of landings as a criterion for qualifying for a permit, the following table (Table 3-15) summarizes the number of vessels that would be permitted into the system.

Table 3-15. Summary of SFAC recommended criteria for initial issuance of a limited entry permit.		
Permit Type	Initial Issuance Criteria	Anticipated Number of Qualifying Vessels
Market Squid Vessel Permit	Possession of a valid 2000/01 market squid permit; 50 market squid landings between January 1, 1990 and November 12, 1999	71
Market Squid Brail Permit	Possession of a valid 2000/01 market squid permit; 10 market squid landings brail landings between January 1, 1990 and November 12, 1999; landings may come from more than one vessel if they can be tied to a valid permit holder	15 (note: 8 of these 15 vessels also qualify for a vessel permit)
Market Squid Light Boat	Possession of either a market squid vessel or light boat owner permit during the 2000/2001 permit year	167 (245-71-15+8)

3.4.4.2 Options for Initial Issuance of Market Squid Fleet Permits

Option I.1 (Proposed project):

- Market squid vessel permit (transferable): a) possession of a current market squid vessel permit and b) a minimum number of landings (range 50-150 landings) during a specific window period (Table 3-16; 51-112 vessels qualify).
- Market squid vessel permit (non-transferable): a) have possessed a California commercial fishing license for at least 20 years; and b) have made at a minimum number of landings (range 33-50) of market squid in any one permit year (a maximum of ten vessels qualify).
- Market squid brail permit (transferable): a) possession of a current market squid vessel permit and b) a minimum number of landings (range 5-25 landings) during a specific window period (Table 3-17, 4-29 vessels qualify).
- Market squid brail permit (non-transferable): a) have possessed a California commercial fishing license for at least 20 years, and b) a minimum number of landings [range 5-25 landings (approximately 6 vessels qualify)].
- Market squid light boat owner permit (transferable): a) possession of either a current market squid vessel permit or a current market squid light boat owner permit and b) have submitted one light boat log [DFG 149b(9/01)] during a specific window period (Table 3-18).

- No provisions for non-transferable market squid light boat owner permits are proposed.

Table 3-16. Number of vessels qualifying for transferable market squid vessel permit based on a minimal number of landings. Source: CDFG Landing Receipts.				
Number of landings	I. 1/01/90 through 11/12/99	II. 1/01/90 through 12/31/00	III. 1/01/90 through 12/31/01	IV. 1/01/90 through 12/31/02
25	88	99	104	112
50	71	86	92	96
75	65	79	85	90
100	58	68	79	83
125	51	61	71	74
150	51	57	63	66
Capacity goal	52	52	52	52

Table 3-17. Number of vessels qualifying for transferable market squid brail permit based on a minimal number of landings. Note: Vessels that qualify for a brail permit that also qualify for a market squid vessel permit are in parentheses (x) based on a minimum of 50 landings criteria. Source: CDFG Landing Receipts.				
Number of landings	I. 1/01/90 through 11/12/99	II. 1/01/90 through 12/31/00	III. 1/01/90 through 12/31/01	IV. 1/01/90 through 12/31/02
5	20 (8)	23 (9)	27 (14)	29 (14)
10	15 (8)	19 (9)	24 (14)	25 (13)
15	6 (2)	11 (4)	13 (9)	14 (6)
20	4 (2)	8 (4)	10 (8)	10 (5)
25	4 (2)	8 (4)	9 (8)	10 (5)
Capacity goal	18	18	18	18

Table 3-18. Number of light boats qualifying for transferable light boat owner permit based on submission of a minimum of one logbook through the Department's market squid logbook program. Note: Using a 50 minimum landing for vessel permits and ten landings for brail permits, the number of light boats that also qualify for a vessel permit are in brackets [x] and the number of light boats that also qualify for a brail permit are shown in parenthesis (x).			
Light boats	I. 6/01/00 through 12/31/00	II. 6/01/00 through 12/31/01	III. 6/01/00 through 12/31/02
Number of light boats	64 [7] (5)	75 [7] (6)	77 [8] (6)
Capacity goal	52	52	52

Using the Department recommended minimum landings for vessel and brail permits, and the requirement of a logbook submitted to indicate lighting activity for a light boat owner permit, the likely number of vessels issued permits in the initial year of restricted access is shown in Table 3-19 for the four time periods considered (Period I: 01 January 1990 through 12 November 1999; Period II: 01 January 1990 through 31 December 2000; Period III: 01 January 1990 through 31 December 2001; Period IV 01 January 1990 through 31 December 2002).

The provisions of FGC §8101 specifies that any licensed 20-year California commercial fisherman is eligible to participate in the first year of a newly-established (by statute or regulation) limited entry program provided there is demonstration of one season of prior participation in the fishery. Based on analysis of landings information, current squid

permittees that have actively participated in the squid fishery have done so by making an average of 33 landings per season from 1981 to 1999. Although difficult to estimate, catch information from currently permitted vessels indicates there are approximately 12 vessels-owners that made 33 landings or more in a single season that would qualify under these criteria, provided their owners are 20-year California commercial fishermen. These vessels do not otherwise qualify under the Department's initial issuance proposal for vessel permits. It is anticipated that these 12 vessel-owners would meet the grandfather criteria for non-transferable market squid vessel permits as their fishing activity took place largely during the early 1980s, and they are registered vessels-owners in the state of California. An additional 30 vessels were identified as meeting the 33 landing criteria subsequent to the Department recommended window period. As most of these vessels are from out-of-state and are only recent participants in the fishery, it is not anticipated that the owners of these vessels will likely be 20-year California commercial fishermen.

Similarly, for brail permits, analysis of landings information indicates that current squid permittees that have actively participated in the brail fishery have done so by making an average of 10 landings per season from 1981 to 1999. Again, it is difficult to estimate which vessel-owners would qualify, but catch information from 1981 through 2001 indicates there are approximately 38 vessel-owners that made 10 brail landings or more in a single season that would qualify under these criteria for non-transferable market squid brail permits, provided they are 20-year California commercial fishermen. However, based on fishing activity for these vessel-owners, it is likely that a maximum of 6 vessels would meet these suggested criteria as the fishing activity took place largely during the early 1980s, and they are registered vessel-owners in the state of California.

Since statute provides opportunity for 20-year California fishermen to enter the fishery for the first year of a limited entry program with proof of prior participation, and since the 33 landings average has been recommended as criteria to deem participation in a season for vessel participation, it would follow that similar provisions should be established to allow participants to qualify for a light boat owner permit. However, at this time there is no other appropriate evidence available to establish participation and there is no provision in the restricted access options to issue "grandfather" non-transferable light boat owner permits.

Table 3-19. Likely number of vessels permitted by type of permit assuming that the vessels will purchase the permit with the greatest options (market squid vessel permit > brail permit > light boat owner permit). Source: CDFG Landing Receipts.				
Criteria	Period I	Period II	Period III	Period IV
Transferable permits				
50 landings	71	86	92	96
10 brail landings	7	11	16	25
1 light boat log	52	63	65	65
Total transferable permits	130	160	173	186
Non-transferable				

permits				
Vessel grandfather option	12	8	7	7
Brail grandfather option	6	6	6	6
Total possible non-transferable permits	18	14	13	13
Total possible permits	148	174	186	199
Capacity goal	104	104	104	104

Option I.2 (Status quo for number of permits only): Issue permits to current permittees, those holding permits for the 2003-2004 permit year (approximately 184 market squid vessel permits and 41 market squid light boat owner permits would qualify). There would be no issuance of market squid brail permits because that permit does not exist at this time and no provision is allowed for 20-year California commercial fishermen.

Option I.3: Allow permit purchase by any permit holder who held a permit in the first year of the moratorium (301 permits were purchased: 239 market squid vessel permits and 62 market squid light boat owner permits). There would be no market squid brail permits because that permit does not exist at this time.

Option I.4:

- Market squid vessel permit (transferable): a) possession of a current market squid vessel permit and b) a minimal number of market squid landings during a specific window period (see table 3-16) OR c) possession of a current market squid vessel permit, and d) have possessed a California commercial fishing license for at least 20 years, and e) have made a minimal number of landings [33-50] of market squid in one permit year (approximately 18 additional vessels qualify).
- There are no provisions for non-transferable market squid vessel permits.
- Market squid brail permit (transferable): a) possession of a current market squid vessel permit and b) a minimal number of landings [5-25] during a specific window period (see table 3-17) OR c) have possessed a California commercial fishing license for at least 20 years, and d) have made at least 10 landings of market squid with brail gear in any one permit year (approximately 12 additional vessels qualify).
- There are no provisions for non-transferable market squid brail permits.
- Market squid light boat owner's permit (transferable): a) possession of either a current market squid vessel owner permit or a current market squid light boat owner permit and b) have submitted one light boat log (14 CCR §149 by 31 December 2000 (64 vessels qualify).
- There are no provisions for non-transferable market squid light boat owner permits.

Option I.5: Do not have a permit program (*No project alternative*).

3.4.4.3 Analysis of Option I

Resource Impact

This option does not have any expected effects on the squid resource. The restricted access options (Options I.1, I.2, I.3 and I.4) are not anticipated to have any unfavorable impact on the resource because the proposed project has a seasonal landings limit of 118,000 tons and weekend closures. Limited entry programs, combined with these management measures are designed to promote a sustainable fishery. Limited entry with these management measures has social and economic impacts only, thus, only the impacts to the resource from the seasonal landings limit and weekend closures are relevant and were discussed earlier.

Social and Economic Impact

When the market squid permit was established, there were no criteria for issuance between market vessels and light boats so many market squid vessel permits were issued to light boats. The objective of Option I.1 is to eliminate those vessels that have minimally participated in the fishery. During the moratorium period, 165 vessels landed squid. Under Option I.1, only 71 market squid vessel, 8 brail and 52 light boat vessels would remain. Table 3-20 shows the ex-vessel dollars paid to the qualifying vessels and those that do not qualify. The non-qualifying vessels accounted for an average of 17.2% of ex-vessel revenue during the last five seasons. Because the proposed project has a landings limit, it is believed that the revenue paid to the vessels that do not qualify for initial issuance will be distributed among other vessels.

Table 3-20. Dollars paid ex-vessel for landings greater than two tons divided between vessels that qualify under the proposed project and those that do not qualify. Data Source: CDFG Landing Receipts. Dollars are adjusted for inflation to the 2000 dollar value (source: US Bureau of Labor Statistics).				
Season	Qualifiers	Non-qualifiers	Total	% Non-qualifiers
1990-1991	\$ 4,508,915	\$ 595,976	\$ 5,104,891	11.7
1991-1992	3,504,401	521,024	4,025,425	12.9
1992-1993	2,374,795	436,205	2,811,000	15.5
1993-1994	7,721,820	1,025,862	8,747,682	11.7
1994-1995	15,054,649	1,863,794	16,918,443	11.0
1995-1996	19,973,748	2,027,275	22,001,023	9.2
1996-1997	21,776,350	3,922,941	25,699,291	15.3
1997-1998	2,650,492	192,134	2,842,626	6.8
1998-1999	4,617,080	768,564	5,385,644	14.3
1999-2000	32,380,893	4,632,327	37,013,220	12.5
2000-2001	18,632,153	5,289,361	23,921,514	22.1
2001-2002	15,166,709	4,352,969	19,519,678	22.3
Average for last 5 seasons	\$ 14,689,465	\$ 3,047,071	\$ 17,736,536	17.2

The maximum economic impact to the three main port areas is shown in Table 3-21. Only data since the moratorium period were used for analysis, excluding the 1998-1999 season because an El Niño event that season reduced landings considerably. Again,

because the proposed project has a landings limit, it is believed that the revenue will be redistributed among ports.

Table 3-21. Maximum potential economic affects to counties from initial issuance criteria. Landings data do not include landings two tons or less as a permit was not required. Data Source: CDFG Landing Receipts. Dollars are adjusted for inflation to the 2000 dollar value (source: US Bureau of Labor Statistics).					
Season	Los Angeles	Monterey	Santa Barbara/Ventura counties	Other	Total
1998-1999	\$34,501	\$ 0	\$693,856	\$ 1	\$728,358
1999-2000	649,919	0	3,961,987	2,500	4,614,406
2000-2001	1,620,671	105,440	3,544,872	5,979	5,276,962
2001-2002	1,857,216	143,689	2,333,188	13,313	4,347,406
Average since moratorium	\$1,040,577	\$ 62,282	\$2,633,476	\$ 5,448	\$3,741,783
Projected reduction revenue output	\$1,873,039	\$ 85,949	\$4,081,888	\$ 8,608	\$6,049,484
Projected employment loss	10	1	26	0	37
3-year recent average	\$1,375,935	\$ 83,043	\$3,280,016	\$ 7,264	\$ 649,919
Projected 3-year reduction revenue output	\$2,476,683	\$114,599	\$5,084,025	\$11,477	\$7,686,784
Projected 3-year employment loss	14	1	32	0	47
Economic multipliers Used*					
Revenue	1.8	1.38	1.55	1.58**	N/A
Employment	9.9	8.4	9.7	9.3**	N/A

* Economic multiplier source: U.S. Dept of Commerce, Bureau of Economic Analysis, RIMS II (Regional Input-Output Modeling System).

** Average of three county multipliers used for other category.

Specifically, the squid fleet is diverse in that many vessels also participate in other fisheries such as sardine, mackerel, anchovy or tuna which may impact the number of days fished for squid in a season (Table 3-22). Additionally, fishery activity reflects extreme variability in squid availability during El Niño and La Niña periods, causing volume as well as seasonality of the fishery to fluctuate radically.

Table 3-22. Percent participation in other fisheries by current squid permittees (2002-2003 season) by tons landed. Note: other includes salmon, herring and other in-state commercial fisheries. Source: CDFG Landing Receipts.						
Season	Market Squid	Sardine	Mackerel	Anchovy	Tunas	Other
1998-1999 (El Niño)	12.0	56.5	20.2	2.6	5.0	3.6
1999-2000	63.9	28.1	2.2	3.6	1.1	1.1

Table 3-22. Percent participation in other fisheries by current squid permittees (2002-2003 season) by tons landed. Note: other includes salmon, herring and other in-state commercial fisheries. Source: CDFG Landing Receipts.						
Season	Market Squid	Sardine	Mackerel	Anchovy	Tunas	Other
2000-2001	56.3	25.1	10.6	6.6	0.5	0.9
2001-2002	54.7	28.3	5.7	9.7	0.9	0.7

Under options I.2 and I.3, there would not be any significant change in net economic benefits and fishery community economic activities. However, these options would not meet the capacity goal for the squid fleet and would contribute to excess vessel capacity. Further, these options would not achieve the Policy and Economic Guidelines of the Commission's restricted access policy. Specifically, they would not provide for an orderly fishery or maintaining the long-term economic viability of the squid fishery.

An analysis of the social and economic impacts for Option I.4 would be similar to Option I.1, except that Option I.4 would issue transferable permits to 20-year California fishermen meeting the required criteria which would substantially contribute to excess vessel capacity in the market squid fleet. Although it is not known how many grandfather transferable permits would be issued under this option, their issuance would lead to a longer time frame to achieve a vessel capacity goal (Option H.2). Again, this option would not provide for an orderly fishery or maintaining the long-term economic viability of the squid fishery.

Ecological Impacts

There are not any expected other ecological effects.

3.4.4.4 Department Preferred Option

Option I.1 establishes a limited entry program for the California market squid fishery following the established guidelines and policies of the Commission for restricted access commercial fisheries. Limited entry is widely supported by most members of the SRSC, the SFAC, other squid fishing industry and conservation groups, with some processors and fishermen in opposition.

Furthermore, the proposed project sets initial issuance criteria based on prior catch history in the squid fishery for participants wishing to apply for market squid vessel, light boat owner and brail permits in future years (Table 3-23). Limited entry will not in itself immediately accomplish the goals and objectives of providing a sustainable resource and viable fishery for the participants. However, establishment of such a limited entry program with a statewide seasonal catch limit (Option A.2) and weekend closures (Option D.1) should provide protection to the resource and provide a viable fishery for its participants.

The proposed option (Option I.1) for initial issuance establishes a fleet, in size (Table 3-19), that is in proximity with the proposed capacity goal for the market squid fishery

(Option H.3). Further, the proposed transferability options (Options K.3, L.3, M.3 and M.4) provide a mechanism to achieve the proposed capacity goal.

Table 3-23. Summary of proposed project initial issuance limited entry criteria. Source: CDFG Landing Receipts.		
Permit type	Initial issuance criteria	Anticipated number of qualifiers
Market squid vessel permit (transferable)	Possession of a valid 2003-2004 market squid permit; 50 market squid landings between January 1, 1990 and November 12, 1999.	71
Market squid vessel permit (non-transferable)	A 20-year CA commercial fishermen with one season of participation in the squid fishery, defined as making 33 landings or more in that season	12
Market squid brail permit (transferable)	Possession of a valid 2003-2004 market squid permit and made 10 brail landings between January 1, 1990 through November 12, 1999.	7 (15 qualify less 8 that also qualify for vessel permit)
Market squid brail permit (non-transferable)	A 20-year CA commercial fishermen with one season of participation in the squid brail fishery, defined as making 10 brail landings in one season.	6
Market squid light boat (transferable)	The participant must 1) possess <i>either</i> a current market squid permit OR a market squid vessel permit AND 2) submitted one log by December 31, 2000.	52 (64 qualify less 7 that also qualify for vessel permit and another 5 that qualify for brail permit).

3.4.5 Option J. Permit Fees

3.4.5.1 Background

Senate Bill 364 (Sher 1997) created an annual permit fee of \$2500 for the squid fishery for three years (beginning with the 1998-1999 season). SB 1544 (Sher) reduced permits to \$400 beginning with the 2001-2002 season. The reduced fee is still in effect.

Limited entry guidelines require an appropriate fee to implement a limited entry program, while also providing funds for management and research. The current baseline costs for maintaining existing Department programs that deal directly with market squid research, monitoring, enforcement, and license sales exceeds \$954,000 annually. If the Department's preferred option for initial issue of permits is adopted, the number of permits issued would be 130 transferable (71 vessel, 7 brail, 52 light boat). Assuming a minimum of 18 grandfather nontransferable permits issued, there would be 148 permits initially issued (Table 3-24).

Table 3-24. Range of fees for transferable and non-transferable market squid vessel, brail and light boat owner permits.					
Permit type	Initial issuance	\$ 400	\$ 1,000	\$ 2,500	\$ 5,000
Market squid transferable permits					
Vessel	71	\$ 28,400	\$ 71,000	\$ 177,500	\$ 355,000

Brail	7	2,800	7,000	17,500	35,000
Light	52	20,800	52,000	130,000	260,000
Market squid non-transferable permits					
Vessel	12	4,800	12,000	30,000	60,000
Brail	6	2,400	6,000	15,000	30,000
Totals	148	\$ 59,200	\$ 148,000	\$ 370,000	\$ 740,000
Program fees offset by fees (%):		6.2%	15.5%	38.8%	77.6%

Although some revenue is generated from taxes levied on squid landings (\$3.80 per ton), this source of funding is variable and dependent entirely on the success of the fishery year-to-year. Any permit fee established needs to be reevaluated periodically.

3.4.5.2 Permit Fee Options

Option J.1 (Proposed action): Establish an annual permit fee between \$400 and \$5,000 for all squid fishery vessels regardless of type or transferability. The fee should be based on the costs to manage the market squid fishery.

Option J.2: Establish an annual permit fee between \$400 and \$5000 that is based on the costs to manage the market squid fishery. Permit fee may vary by type of squid fishery vessel and transferability of permit.

Option J.3 (Status quo): Maintain existing annual permit fee (\$400).

3.4.5.3 Analysis of Option J

Resource Impact

This option does not have any expected effects on the squid resource.

Social and Economic Impact

An annual permit fee of is a tax-deductible business expense that will impact each vessel owner the cost of the permit annually. This permit will entitle the vessel owner to participate in the limited entry fishery. As long as a restricted access program with transferability is adopted as part of the management of the squid fishery, a vested property value will be conferred on market squid vessel, brail and light boat owner permits above the permit fee. This value will be determined by market conditions. Because of the value added to the permit in a limited entry program with transferability, there would not be any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

There are not any expected other ecological effects.

3.4.5.4 Department Preferred Option

The proposed project requires that an appropriate annual fee for market squid vessel, brail, and light boat owner permits be established to: 1) cover the cost of squid research

and management programs, and 2) provide adequate monitoring and implementation of a limited entry program. The proposed project sets an annual fee of (\$400-\$5000) for squid fishing (vessel and brail) and lighting permits. Since this fee is less than the costs to monitor the fishery, other sources of revenue will be necessary to supplement the program.

3.4.6 Options K, L and M. Transferability of Market Squid Permits

3.4.6.1 Background

Limited entry permits are affixed to the owner (or corporation) of record of the vessel that qualifies. If more permits than the capacity goal are initially issued, transferability provisions can help meet the capacity goal over time while preventing disruption to the fishery. Transferability during the moratorium (1998-present) was not allowed except in cases of the permitted vessel being lost, stolen, destroyed or suffering a major mechanical breakdown. Following Commission guidelines as described above, transferability of limited entry permits should be allowed provided the provisions assist in attainment of the fleet capacity goal.

Selecting an option for transferability will be contingent upon other determinations including a capacity goal and initial limited entry permit issuance criteria. The further away the initial number of permits are from the capacity goal, the more restrictive the provisions for transferability will need to be to achieve the capacity goal over time. As with initial issuance criteria, options presented here are intended to represent the scope of options available and are those that have been suggested by various constituent groups. Development of further options for transferability is entirely contingent upon selection of initial issuance criteria.

3.4.6.2 Market Squid Vessel Permit Transfer Options

Option K.1 (*Status quo*): Do not allow permit transfers except in cases of major mechanical breakdown or loss of the vessel.

Option K.2: Establish full transferability of market squid vessel permits.

Option K.3 (*Proposed action*):

- Establish full transferability of market squid vessel permits based on comparable capacity (within 10%).
- Establish transferability of market squid vessel permits to a vessel of larger capacity (greater than 10%) under a “2 for 1” permit retirement – this option will allow vessel owners to increase their vessel capacity by transferring their permit to a replacement boat and surrendering one additional permits. Permit holders wishing to increase their current capacity more than 10 percent must acquire another market squid vessel permit and surrender it to the Department for retirement.

- Individuals wishing to gain entry into the fishery must secure two permits: one permit must be surrendered to the Department for retirement and one permit for issuance to a vessel that will not increase the fishing capacity (not to exceed a maximum of 10% increase). This will allow a reduction in the number of permits. Market squid light boat owner permits cannot be used to secure a market squid vessel permit.

3.4.6.3 Analysis of Option K

Resource Impact

Under Option K.1 (status quo), the harvesting capacity of the fleet could not increase, but would gradually be reduced through attrition of permits. However, with a seasonal catch limitation in place (Option A.2), a reduction in the harvesting capacity of the fleet will likely not have any effect on the squid resource because of the excess capacity currently in the fleet.

Option K.2 allows the transfer of permits to another vessel with no requirement for comparable capability. Although this option has the potential to increase the harvesting capability of the fleet, the seasonal catch limitation (Option A.2) would prevent this from occurring.

The design of the permit transfer in Option K.3 (proposed option) will limit fleet harvesting capability by requiring vessel-owners wishing to transfer to larger size vessels (greater than 10%) to surrender an additional permit to one additional permit for the transfer. Again, with a seasonal catch limitation in place (Option A.2), a change in the harvesting capacity of the fleet will not have any effect on the squid resource.

Social and Economic Impact

Option K.1 will allow for a more rapid attrition of the fleet, however, it likely will not meet the practical needs of working vessels and can have implications for vessel safety. Option K.2 will provide flexibility to meet the needs of the fleet but will not help to achieve the capacity goal. Option K.3 (proposed option) will prevent increase in fleet capacity while allowing new vessels to enter the fishery, and will assist in achieving the capacity goal through the "2 for 1" permit retirement which would allow vessel owners to increase vessel capacity (greater than 10%) or allow individuals to gain entry to the fishery.

The transferability options for a restricted access program provide for an orderly fishery, promote conservation among fishery participants and maintain the long-term economic viability of the fishery. There would not be any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

The options for transferability of market squid vessel permits are not expected to have any other ecological effects.

3.4.6.4 Department Preferred Option

For market squid vessel permits, the proposed project establishes transferability of these permits to a vessel of comparable capacity, within ten percent. This gives the permit holder some flexibility when another vessel is required because it is often difficult to find exact matches and provides fishermen who wish to retire the opportunity to sell their boat and/or permit to new participants. Additionally, the proposed project allows upgrades via transfer to vessels of larger capacity under specified conditions. Using a “2 for 1” permit retirement system, those in the fleet wishing to increase their catching capacity may do so while simultaneously generating a net loss in overall capacity of the fleet, which will aid in achieving the capacity goal.

3.4.6.5 Market Squid Brail Permit Transfer Options

Option L.1 (*Status quo*): Do not allow permit transfers except in cases of major mechanical breakdown or loss of the vessel.

Option L.2: Establish full transferability of market squid brail permits, provided a 15-ton daily trip limit for these vessels is implemented.

Option L.3 (*Proposed action*): Establish full transferability of market squid brail permits based on comparable capacity (within ten percent).

3.4.6.6 Analysis of Option L

Resource Impact

Brail permits are a minor component of the market squid fleet and do not significantly contribute to the fleet capacity. Options L.1, L.2 and L.3 are not expected to have any affect on the squid resource.

Social and Economic Impact

There is no specific reason to restrict transfer of brail permits as they are a minor component of the fleet and do not significantly contribute to the market squid fleet capacity. Option L.1 will allow for a more rapid attrition of the fleet, however, it likely will not meet the practical needs of working vessels and can have implications for vessel safety. Further, it is anticipated that the initial issuance of brail permits will be below the capacity goal, thus attrition of the fleet would be a suitable option. Option L.2 will provide flexibility to meet the needs of the fleet and, provided that a 15 ton daily trip limit is adopted (not the proposed project, Option C.1), should not increase the harvesting capacity of the brail fleet. If no daily trip limits are adopted (proposed project, Option C.2), Option L.3 helps to meet the needs to the brail fleet without significantly increasing capacity.

The transferability options for a restricted access program provide for an orderly fishery, promote conservation among fishery participants and maintain the long-term economic

viability of the fishery. There would not be any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

The options for transferability of market squid vessel permits are not expected to have any other ecological effects.

3.4.6.7 Department Preferred Option

For brail permits, the Department recommends full transferability of these permits (Option L.3) based on comparable capacity (within 10%). Given they are a minor component of the fleet and the number of currently active brail vessels is less than the suggested capacity goal, there is little concern regarding overcapitalization at this time.

Following implementation, should the number of brail vessels that qualify be below the selected capacity goal, and given that vessels which brail squid simultaneously work with roundhaul vessels as light boats, allowing a “4 for 1” retirement system for market squid light boat owner permits to acquire a market squid brail permit, depending on the initial number of market squid light boat owner permits issued, should be considered (Option M.4).

3.4.6.8 Market Squid Light Boat Owner Permit Transfer Options

Option M.1 (*Status quo*): Do not allow permit transfers except in cases of major mechanical breakdown or loss of the vessel

Option M.2: Establish full transferability of light boat owner permits. This would be allowed only if the initial number of permits issued is equal to or less than the capacity goal.

Option M.3 (*Proposed action*): Establish full transferability of light boat owner permits with a “2 for 1” permit retirement until the capacity goal is reached. When the capacity goal is reached, no additional permit would be required.

Option M.4 (*Proposed action*): Trade either 2,3 or 4 light boat owner permits for one brail permit – a light boat may acquire and surrender additional light boat owner permits in exchange for a brail permit. The range (2-4) would be selected based on whether the initial number of permits issued is equal to or greater than the capacity goal. This option will decrease light boat capacity, but there would be a subsequent increase in brail capacity.

3.4.6.9 Analysis of Option M

Resource Impact

The design of the permit transfer system does not allow for increases in the number of light boats in the fleet. Options M.1, M.2, M.3 and M.4 are not expected effects on the squid resource.

Social and Economic Impact

It is anticipated that the number of light boat owner permits initially issued will be above the capacity goal (Option H.3). Option M.1 will allow for a more rapid attrition of the fleet, however, it likely will not meet the practical needs of working vessels and can have implications for vessel safety. Option M.2 will provide flexibility to meet the needs of the fleet, however, it will not provide a method to reduce the number of permits to the proposed capacity. Option M.3 helps meet the fleets' needs for transferability while helping to achieve the light boat capacity goal. Option M.4 helps to achieve both the light boat capacity goal and the brail capacity goal while meeting the needs of the fleet for transferability.

The transferability options for a restricted access program provide for an orderly fishery, promote conservation among fishery participants and maintain the long-term economic viability of the fishery. There would not be any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

Because the design of the permit transfer system does not allow for increases in the harvesting capability of the fleet, there are not any expected other ecological effects.

3.4.6.10 Department Preferred Option

As transferability has been identified as a primary method to aid in achieving capacity goals once an initial number of permits has been determined, provisions for transferability are largely dependent on the difference between the number of initial permits and the selected capacity goal. In the case of light boats, the number of initial vessels identified under various initial issuance criteria options is highly variable. Hence, transferability options established in the proposed project are widely varied. Provided the proposed and more restrictive initial issuance criteria is adopted (Option I.1), which is anticipated to yield a number of vessels close to the capacity goal, the Department recommends establishing transferability under a "2 for 1" retirement system (Option M.3) until the capacity goal is reached, at which time transferability of market squid light boat owner permits will no longer be restricted. Further, the Department also recommends Option M.4 that helps to reduce the number of light boat owner permits while providing an opportunity for an increase in the number of brail permits.

3.4.7 Option N. Permit Transfer Fee Options

3.4.7.1 Background

Transfer fees need to be established to assist with administrative costs associated with permit transfers in addition to the cost of squid research and management programs, and to provide adequate monitoring and implementation of a restricted access program. This option would set a fee for permit transfers. Presently, the transfer fee is \$250.

3.4.7.2 Permit Transfer Fee Options

Option N.1 (Proposed action): Set the permit transfer fee between \$250 and \$1,000.

Option N.2 (Status quo): Continue the existing permit transfer fee of \$250.

3.4.7.3 Analysis of Option N

Resource Impact

This option does not have any expected effects on the squid resource.

Social and Economic Impact

Transfer of permits confers a value on the permit itself and provides the participants a greater stake in the resource, a sense of ownership and confidence that a long-term opportunity exists in the fishery. Transferable permits with a fee between \$250 and \$1000 would not have any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

There are not any expected other ecological effects.

3.4.7.4 Department Preferred Option

The proposed project should establish an appropriate fee to transfer market squid vessel, brail, and light boat owner permits to assist with transfer administrative costs. The Department recommends establishing a permit transfer fee between \$250 and \$1000 for permits transferred to a new owner or vessel.

3.5 Other Ecological Concerns

3.5.1 Option O. Lighting Gear Restrictions

3.5.1.1 Background

Most vessels (>90%) that participate currently in the market squid fishery use roundhaul gear (i.e., purse seine, drum seine) to catch squid; light boats are used concomitantly with seiners. A light boat is typically a smaller vessel with several high-powered lights located at various levels around the vessel. The purpose of the lights is to attract and aggregate spawning squid to surface waters.

By the summer of 1999, seabird researchers, the American Trader Trustee Council and the National Park Service for the Channel Islands National Park became concerned about potential effects of attracting lights used by the squid fleet on nesting seabirds at nearby islands. Specifically, their concerns centered on disturbance to the island breeding colonies from high wattage lights and noise from market squid fishing vessels and they requested that the Department take action to prevent potential new impacts on the nesting birds.

As part of its interim regulatory authority, the Commission adopted regulations requiring that lights used for attracting squid be shielded and light wattage be limited to 30,000 watts per vessel based on a potential negative interaction between lights used for squid fishing and nesting seabirds on offshore islands in southern California. At the time the light restrictions were adopted, the Commission asked the Department to report as to effectiveness of the interim measures in a year. Although the Department has attempted to measure the effectiveness of these gear restrictions, a threshold value for light intensity that negatively impacts the breeding success of seabirds has not been determined.

In addition to the potential effects of lights on nesting seabird colonies, the growth of the southern California fishery coincided with complaints from coastal communities about the intensity of the squid vessel lights. It is not known what prompts squid to deposit their eggs at certain locations and if they return to the same spawning site where they hatched. These factors, combined with environmental changes, affect where the squid fishery operates at any given time. Some seasons, fishing is concentrated along the coastline while other times it is farther offshore at islands. The lack of consistency among squid spawning sites from year to year further complicates the issue because many years squid fishing pressure is reduced along the southern California coastline.

However, the shielding and wattage regulations serve to reduce the total amount of light transmitted to coastal communities, specifically the cities of Monterey and Malibu. Shielding and wattage restrictions were put in place (May 2000). No complaints from southern California coastal communities about the lights from the squid vessels were documented in 2000 and 2001. In January 2002, the Laguna Beach police received about 40 calls from residents regarding squid fishing in waters less than half a mile offshore. In 2002, fishing activity in Monterey Bay tripled compared with the average for the area. Yet, enforcement received only general complaints from the community about the squid fishing lights at night; enforcement personnel took action against operators with shielding violations (T. Olivas, pers. comm.)

3.5.1.2 Gear Restriction Options

Option O.1: (Proposed action and status quo): Maintain existing gear restrictions which state that each vessel fishing for squid and lighting for squid will utilize a total of no more than 30,000 watts of light to attract squid at any time and that each vessel fishing for squid or lighting for squid will reduce the light scatter of its fishing operations by shielding the entire filament of each light used to attract squid and orient the illumination

directly downward, or provide for the illumination to be completely below the surface of the water.

Option O.2: Remove existing gear options regarding shields and wattage.

3.5.1.3 Analysis of Option O

Resource Impact

This option does not have any expected effects on the squid resource.

Social and Economic Impact

Maintaining current shielding and wattage restrictions on lighting gear (Option O.1) is the status quo. The current regulations are meant to reduce the total amount of light each vessel may use and keep the light from shining on land where it may impact seabirds or coastal communities and have no impact on the market squid resource. There would not be any significant change in net economic benefits and fishery community economic activities.

Further, the wattage and shielding regulations do not appear to have reduced squid landings as evidenced by the 2000-2001 landings. The 2000-2001 season was the first season with the lighting regulations and landings that season were within three percent (123,411 tons) of the highest season on record (1999-2000). Because Option O.1 is status quo, there are no significant social or economic impacts from the shielding and wattage restrictions on the squid fishery.

The alternative (Option O.2) of eliminating shielding and wattage restrictions would have no significant social or economic impacts on the fishery.

Ecological Impacts

Maintaining existing gear restrictions (Option O.1) is not likely to increase squid fishery-seabird interaction rates. If area and time closures are selected as part of the squid fishery management plan (Options P.1, P.2, P.3 or P.4), not all seabird nesting sites would be protected; continuing shielding and wattage restrictions would reduce light pollution to the rookeries as well as reduce squid fishery interactions with seabirds. Additionally, Option O.1 is not likely to increase squid fishery-marine mammal interaction rates as the overall fishing effort for squid vessels and light boats would be equal to the status quo.

Removing existing gear restrictions (Option O.2) that limit wattage to 30,000 watts or less and require lights to be shielded is likely to have a significant negative impact on seabird rookeries. If area and time closures are put in place for the squid fishery, not all seabird nesting sites are protected; discontinuing the gear restrictions is likely to increase squid fishery interactions with seabirds. Further, there is a strong likelihood that removing the shields and wattage restrictions will lead to a renewed increase in complaints from coastal communities.

3.5.1.4 Department Preferred Option

The proposed project continues existing gear restrictions on light wattage and shielding that were implemented by regulation to address potential interactions with coastal communities and nocturnal seabirds.

3.5.2 Option P. Area and Time Closures to Address Seabird Issue

3.5.2.1 Background

Three species are the focus of the squid fishery interaction with seabirds: the California brown pelican (*Pelecanus occidentalis californicus*), Xantus's murrelet (*Synthliboramphus hypoleucus*), and ashy storm-petrel (*Oceanodroma homochroa*). Brown pelicans are federally and State-listed as an endangered as well as fully protected species. Xantus's murrelets are a candidate species for listing as threatened. The petition to list this species cited the expansion of the commercial squid fishery as part of the rationale for listing. Ashy storm-petrels are classified by the Department and the U.S. Fish and Wildlife Service as Species of Special Concern. In total, there are 14 seabird species that breed on Santa Barbara, Anacapa and San Miguel islands, one endangered species, one candidate species and five species of which are species of special concern (Table 3-25). In addition to these nesting species, there are numerous other species associated with State waters that forage near these islands (Table 3-26).

Table 3-25. Seabird species that breed (indicated by an X) on Anacapa, Santa Barbara, and San Miguel islands in the Channel Islands.			
SPECIES	ANACAPA	SANTA BARBARA	SAN MIGUEL
<i>Diurnal species</i>			
Brown pelican*	X	X	roost
Double-crested cormorant***	X	X	X
Brandt's cormorant	X	X	X
Pelagic cormorant	X	X	X
Western gull	X	X	X
Pigeon guillemot	X	X	X
Tufted puffin***			X
Western snowy plover****			not since 1991
Black oystercatcher	X	X	X
<i>Nocturnal species</i>			
Ashy storm-petrel***	probable	X	X
Black storm-petrel***		X	X
Leach's storm-petrel		X	X
Xantus's murrelet**, ***	X	X	X
Rhinoceros auklet***			X
Cassin's auklet	X	X	X

* Federally and State listed as endangered

** State candidate species for listing as threatened

*** State Species of Special Concern

Table 3-26. Seabirds found in California state waters with the federal and state status if applicable*.	
Species	Status**
Red-throated Loon (<i>Gavia stellata</i>)	
Pacific Loon (<i>G. pacifica</i>)	
Arctic Loon (<i>G. arctica</i>)	
Common Loon (<i>G. immer</i>)	SSC
Horned Grebe (<i>Podiceps auritus</i>)	
Red-necked Grebe (<i>P. grisegena</i>)	
Eared Grebe (<i>P. nigricollis</i>)	
Western Grebe (<i>Aechmophorus occidentalis</i>)	
Clark's Grebe (<i>A. clarkii</i>)	
Black-footed Albatross (<i>Phoebastria nigripes</i>)	
Northern Fulmar (<i>Fulmarus glacialis</i>)	
Pink-footed Shearwater (<i>Puffinus creatopus</i>)	
Buller's Shearwater (<i>P. bulleri</i>)	
Sooty Shearwater (<i>P. griseus</i>)	
Short-tailed Shearwater (<i>P. tenuirostris</i>)	
Black-vented Shearwater (<i>P. opisthomelas</i>)	
Fork-tailed Storm-petrel (<i>Oceanodroma furcata</i>)	SSC
Leach's Storm-petrel (<i>O. leucorhoa</i>)	
Ashy Storm-petrel (<i>O. homochroa</i>)	FSC, SSC
Black Storm-petrel (<i>O. melania</i>)	SSC
Least Storm-petrel (<i>O. microsoma</i>)	
California Brown Pelican (<i>Pelecanus occidentalis californicus</i>)	FE, SE, FP
Brandt's Cormorant (<i>Phalacrocorax penicillatus</i>)	
Double-crested Cormorant (<i>P. auritus</i>)	SSC
Pelagic Cormorant (<i>P. pelagicus</i>)	
Black Scoter (<i>Melanitta nigra</i>)	
White-winged Scoter (<i>M. fusca</i>)	
Surf Scoter (<i>M. perspicillata</i>)	
Western Snowy Plover (<i>Charadrius alexandrinus nivosus</i>)	FT, SSC
Black Oystercatcher (<i>Haematopus bachmani</i>)	
Red Phalarope (<i>Phalaropus fulicaria</i>)	
Red-necked Phalarope (<i>P. lobatus</i>)	
South Polar Skua (<i>Stercorarius maccormicki</i>)	
Pomarine Jaeger (<i>S. pomarinus</i>)	
Parasitic Jaeger (<i>S. parasiticus</i>)	
Bonaparte's Gull (<i>Larus philadelphia</i>)	
Heermann's Gull (<i>L. heermanni</i>)	
Mew Gull (<i>L. canus</i>)	
Ring-billed Gull (<i>L. delawarensis</i>)	
California Gull (<i>L. californicus</i>)	SSC
Herring Gull (<i>L. argentatus</i>)	
Thayer's Gull (<i>L. thayeri</i>)	
Western Gull (<i>L. occidentalis</i>)	
Glaucous-winged Gull (<i>L. glaucescens</i>)	
Sabine's Gull (<i>Xema sabini</i>)	
Black-legged Kittiwake (<i>Rissa tridactyla</i>)	
Caspian Tern (<i>Sterna caspia</i>)	
Royal Tern (<i>S. maxima</i>)	
Elegant Tern (<i>S. elegans</i>)	FSC, SSC

Table 3-26. Seabirds found in California state waters with the federal and state status if applicable*.	
Species	Status**
Common Tern (<i>S. hirundo</i>)	
Arctic Tern (<i>S. paradisaea</i>)	
Forster's Tern (<i>S. forsteri</i>)	
California Least Tern (<i>S. antillarum browni</i>)	FE, SE, FP
Black Tern (<i>Chlidonias niger</i>)	FSC, SSC
Black Skimmer (<i>Rynchops niger</i>)	SSC
Common Murre (<i>Uria aalge</i>)	RE
Pigeon Guillemot (<i>Cephus columba</i>)	
Marbled Murrelet (<i>Brachyramphus marmoratus</i>)	FT, SE
Xantus's Murrelet (<i>Synthliboramphus hypoleucus</i>)	FSC, SSC, FPL,
Craveri's Murrelet (<i>S. craveri</i>)	
Ancient Murrelet (<i>S. antiquus</i>)	
Cassin's Auklet (<i>Ptychoramphus aleuticus</i>)	
Rhinoceros Auklet (<i>Cerorhinca monocerata</i>)	SSC
Tufted Puffin (<i>Fratercula cirrhata</i>)	SSC
Osprey (<i>Pandion haliaetus</i>)	SSC
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	FT, SE, FPD

FE Federally listed as endangered under ESA FSC Federal species of concern

FPD Federal proposed for delisting

FPL Petitioned for federal listing under ESA DFG

FP Fully protected under FGC §3511

FSC Federal species of concern

FT Federally listed as threatened under ESA SSC State species of special concern

RE Subject of Department restoration efforts

SE State listed as endangered under CESA FPD Federally proposed for delisting

SSC State species of special concern

ST State listed as threatened under CESA

CAN State Candidate Species under CESA

Seabirds nest at the Channel Islands to avoid mammalian predators. Some smaller island nesting birds come and go to their burrows at night to further avoid predation. The typical seabird nesting period for the islands is during the spring and summer months (all six species: January through October; brown pelicans: typically February through September, but can start nesting as early as January and extend through October).

Three areas that provide habitat for the majority of the breeding seabirds in southern California are Santa Barbara, Anacapa, and San Miguel islands. Although only 6-10% of the total California brown pelican population breed in the Southern California Bight (most of this subspecies nest in the Gulf of California), Santa Barbara and Anacapa islands are the sole nesting colonies in the United States (Gress and Anderson 1983); of these, 85% nest on West Anacapa Island (F. Gress, unpubl. data). Approximately 80% and 50% of Xantus's murrelet and ashly storm-petrel breeding populations in the United States, respectively, nest at these same islands. Seabirds that use these three islands for nesting are shown in figs. 3-6 (A-C).

Close to breeding colonies, artificial lighting may result in adult birds avoiding the colony and not returning to their nests to attend their eggs and chicks. Even on a moonless night, lighted vessels are capable of increasing light levels at a colony up to moonlight

levels. Physics calculations show that one unshielded vessel burning 30,000 watts needs to be about a mile away from a colony to bring the light levels down to moonlight levels and even further to emit levels below moonlight (Dr. Fajans pers. comm.). Successive nights of high artificial light levels, in combination with the lunar cycle, close to breeding colonies could disrupt the normal nesting activities of these birds, resulting in increased predation, nest abandonment, or increased mortality of eggs and chicks.

Murrelet, auklet and storm-petrel fledglings depart colonies only at night. They also may become attracted and disoriented by lights and collide with vessels, increasing the normal mortality rates of young-of-the-year and is a major concern for survival of these species (Byrd et al 1978, Reed et al. 1985, Reed 1987, Telfer et al. 1987, Harrison 1990). Disorientation from lights leading to parent-chick separation of Xantus's murrelets has been observed in the Channel Islands (Keitt, Kelly, Naughton, and McChesney, pers. comm.).

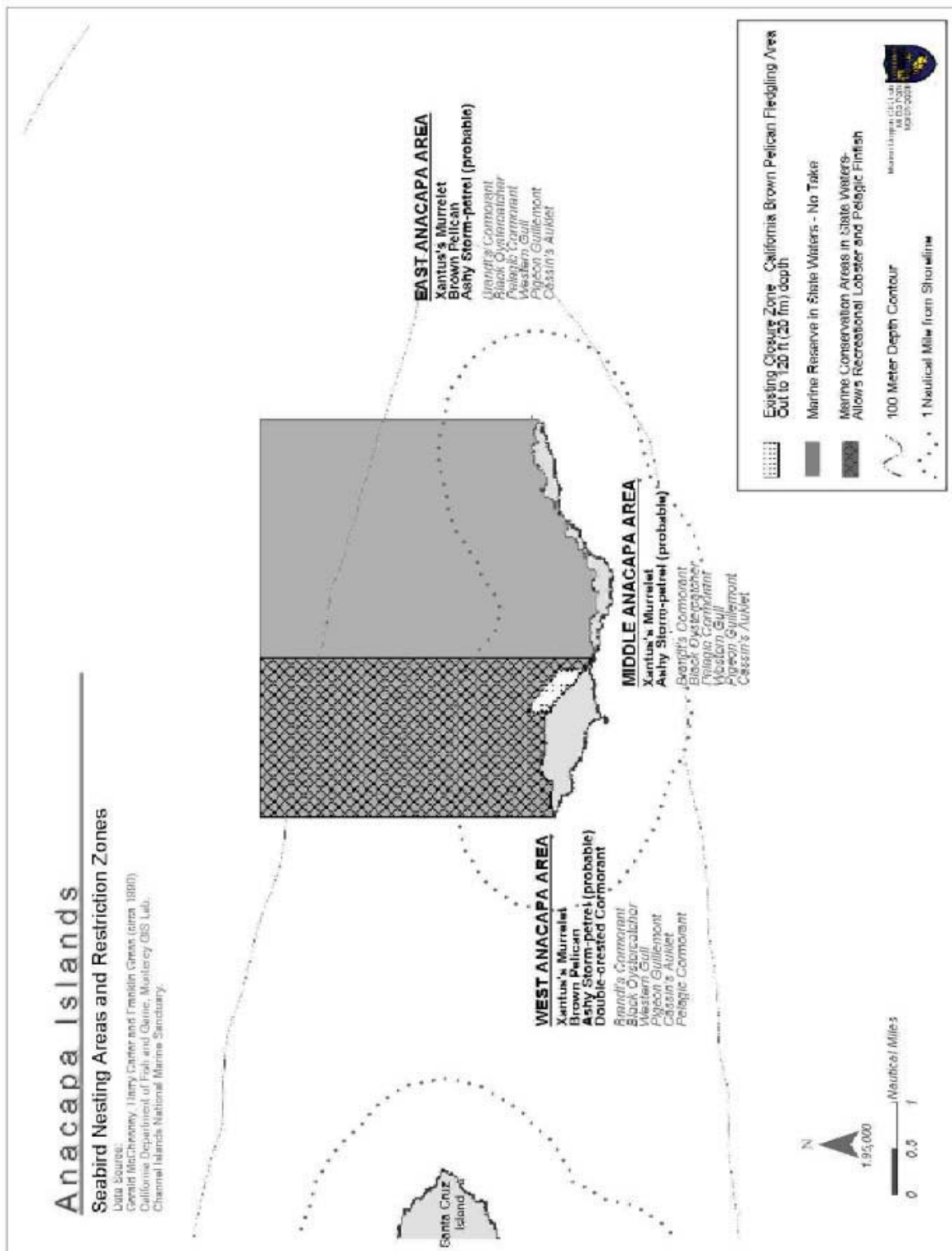


Figure 3-6A. Anacapa Island showing boundary of proposed area closure for seabird protection from 01 February through 30 September.

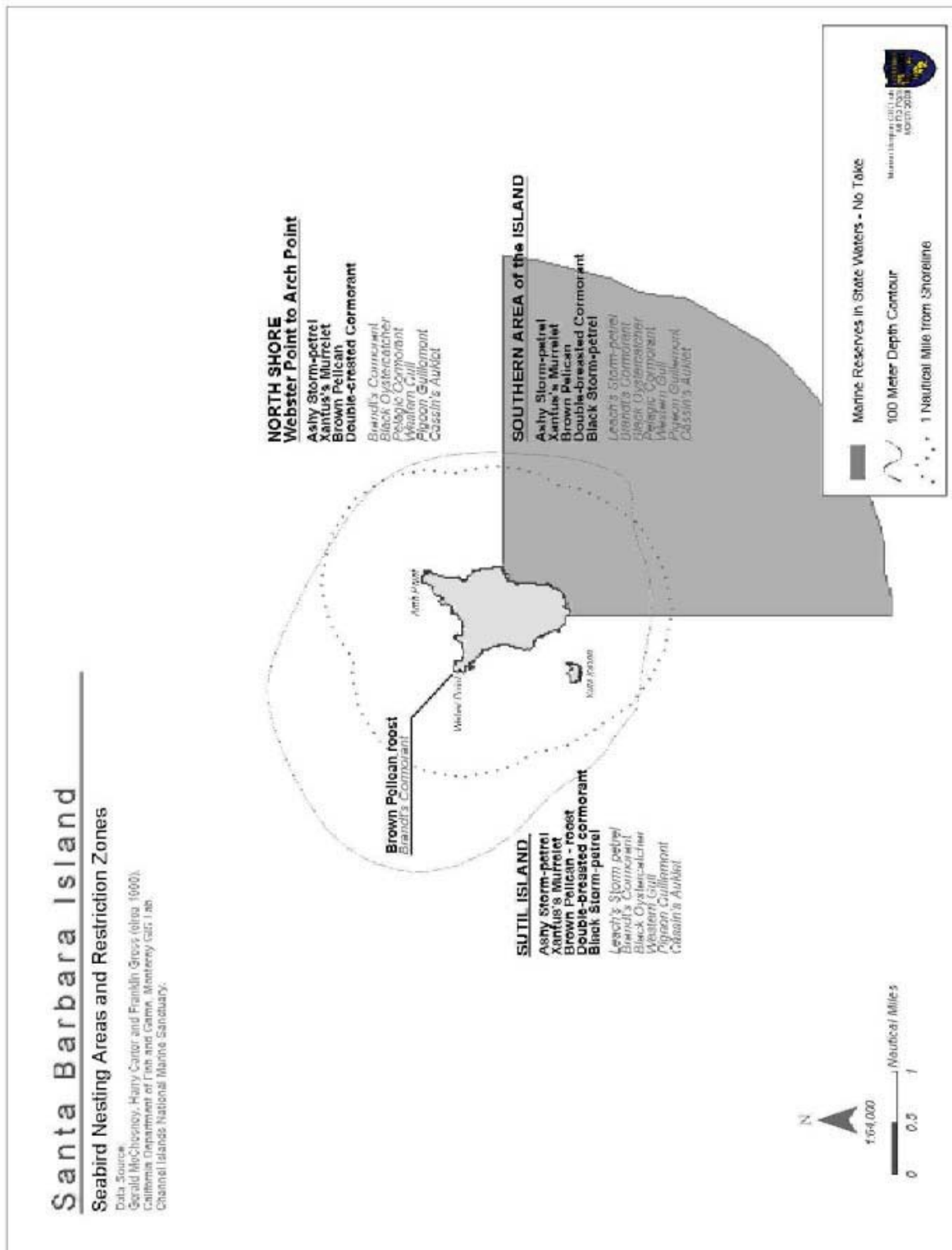


Figure 3-6B. Santa Barbara Island showing boundary of proposed area closure for seabird protection from 01 February through 30 September.

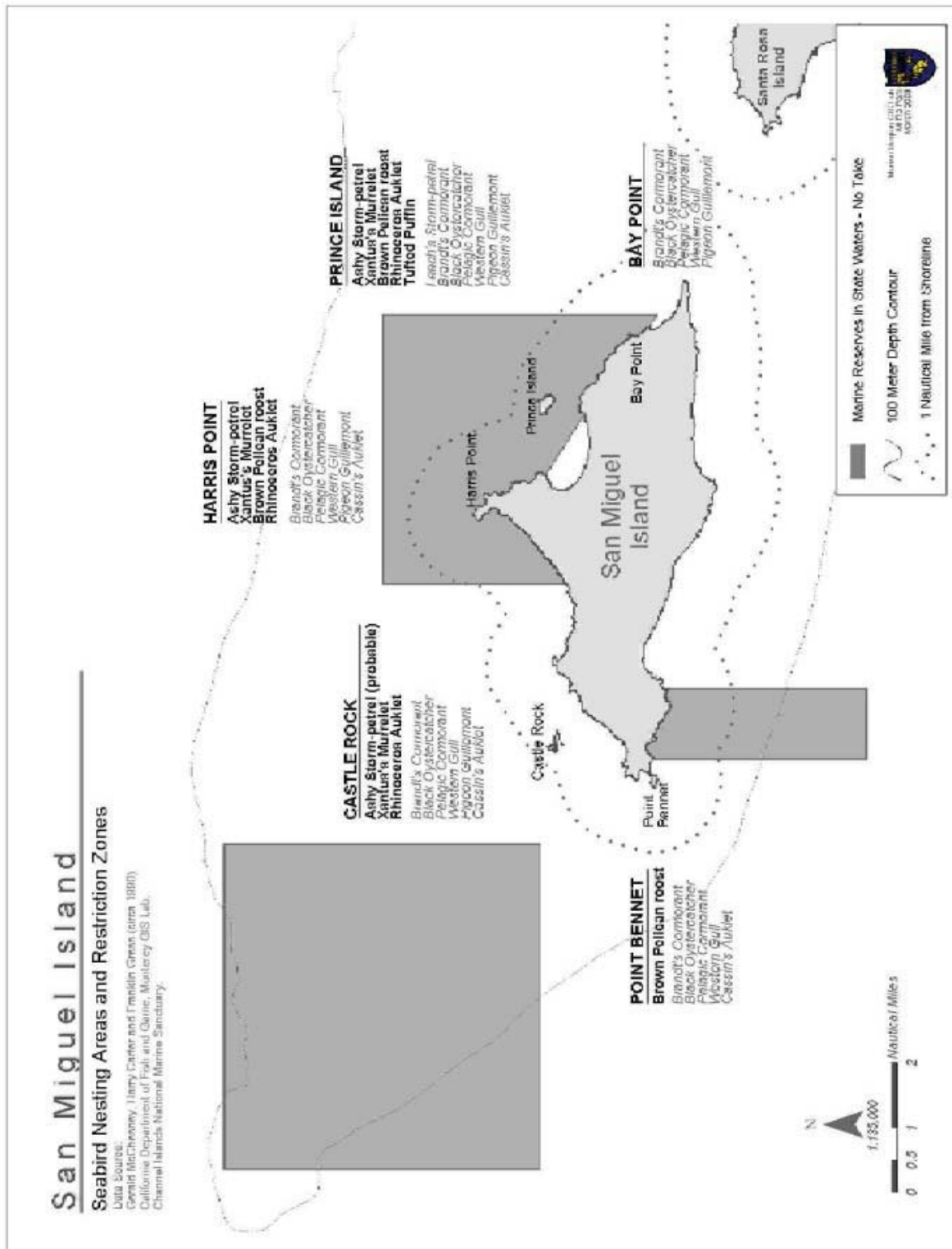


Figure 3-6C. San Miguel Island showing boundary of proposed area closure for seabird protection from 01 February through 30 September.

There are documented interactions of inflight strikes of ashy storm-petrels and Xantus's murrelets with lighted fishing vessels and other lighted vessels, particularly on dark, foggy nights, in the Channel Islands (Whitworth et al. 1997, Carter et al. 1999, McChesney and Naughton, pers. comm.). Breeding seabirds in California that are susceptible to inflight strikes include Xantus's murrelet, Cassin's auklet, rhinoceros auklet, all of the storm-petrel species (ashy, black, fork-tailed, and Leach's), and the fledgling chicks of tufted puffins. When flying in total darkness, seabirds may become disoriented by and attracted to bright artificial lights (Verheijen 1958, Reed et al. 1985, Telfer et al. 1987). This may cause birds to crash into lighted boats, which can result in direct mortality or result in birds either falling stunned and/or injured into the water or landing on deck (Dick and Donaldson 1978). Injured birds become easy targets for predation after daylight.

3.5.2.1.1 California Brown Pelican Productivity, La Niña and the Market Squid Fishery

It is documented that brown pelicans require a nesting ground that is free from human disturbance (Gress and Anderson 1983). In fact, this was the rationale behind the closure at Anacapa Island Ecological Reserve established in 1979 by the Commission (14 CCR §630 Subsection 5C.1E). This closed area, offshore from the pelican colony on West Anacapa, was designated as a reserve to prevent human disturbance to nesting brown pelicans and their chicks. It is closed seaward to 20 fathoms to both commercial and recreational craft from 1 January through 31 October.

Dr. Franklin Gress (UC Davis) observed that brown pelican nest abandonment at Anacapa Island in 1999 coincided "precisely with a potentially very disruptive disturbance factor [in the form of the squid fishery] close to the breeding colonies." Squid landing data for 1999 indicated that squid fishing in southern California, specifically at the Channel Islands, coincided with breeding seasons of most seabird species (Henry et al. 2003). According to Dr. Gress's data, nest abandonment in 1999 was 47% (Table 3-27), 11% lower (significantly lower) than the 1976-1998 mean. The young-fledged-per-successful-nest-rate (excluding nest abandonment) was 1.08, 19% lower than the 1976-1998 mean. Food shortages at critical times are believed to be the primary cause for nest abandonment and chick mortality, which results in low productivity. However, during 1999, cold-water La Niña conditions were in effect, which makes poor food availability an unlikely cause. Although a causal relationship has not been established between lights in the southern California's squid fishery and low productivity rates for brown pelicans, disorientation, increased predation, and nest abandonment are well documented in some bird species exposed to excessive light during nighttime hours. The possibility of altered endocrine or hormonal levels caused by exposure to continued lights also exists (J. Gessaman, pers. comm.).

Table 3-27. Chick mortality, nest abandonment and overall productivity (chicks fledged per nest attempt) data for brown Pelicans nesting at Anacapa Island (Gress, pers. comm.). Note: productivity was lowest for the 1999 breeding season.

	1997	1998	1999	2000	2001	1976-2001 Mean
Chick mortality	49%	4%	35%	6%	17%	20%
Nest abandonment	55%	40%	47%	33%	40%	47%
Productivity	0.60	0.88	0.57	0.90	0.65	0.65

3.5.2.2 Area and Time Closures to Address Seabird Issue Options

Option P.1: Establish areas that are closed to squid fishing around San Miguel, Anacapa and Santa Barbara islands from 1 February through 30 September. The area closure should be one nautical mile from the high water mark for these islands. The closure would protect 14 seabird species (including one endangered, one candidate species and five species of special concern) during their breeding seasons (see figs. 3-6A-C).

Option P.2: Establish areas that are closed to squid fishing around Anacapa and Santa Barbara islands from 1 February through 30 September. The area closure should be one nautical mile from the high water mark for these islands. The closure would protect 12 seabird species (including one endangered, one candidate species and three species of special concern) during their breeding seasons (see figs. 3-6A-B).

Option P.3: Establish areas that are closed to squid fishing *using attracting lights* around San Miguel, Anacapa and Santa Barbara islands from 1 February through 30 September. The area closure should be one nautical mile from the high water mark for these islands. The closure should offset the potential negative impacts of light pollution at seabird rookeries for 14 seabird species (including one endangered, one candidate species and five species of special concern) during their breeding seasons (see figs. 3-6A-C).

Option P.4 (Proposed option): Establish areas for fishing for squid *using attracting lights* around Anacapa and Santa Barbara islands from 1 February through 30 September. The area closure should be one nautical mile from the high water mark for these islands. The closure should offset the potential negative impacts of light pollution at seabird rookeries for 12 seabird species (including one endangered species, one candidate species and three species of special concern) during their breeding seasons (see figs. 3-6A-B).

Option P.5 (Status quo): Do not establish area and time closure sites for seabird protection.

3.5.2.3 Analysis of Option P

Resource Impact

The creation of areas that are close to either squid fishing (Options P.1 and P.2) or closed the fishing with lights (Options P.3 and P.4) should have a positive effect on the squid resource. These areas will serve as harvest replenishment areas for market squid and should protect some fraction of target and bycatch populations.

Option P.5 is not expected to affect the squid resource.

Social or Economic Impact

Since the fishery targets spawning squid in shallow waters, a closure of one mile around Anacapa, Santa Barbara and San Miguel islands would essentially close these areas to the squid fishery during the seabird breeding season. The Channel Island Marine Reserves went in to effect 9 April 2002. The reserve areas selected at Anacapa, Santa Barbara and San Miguel closed areas with highest squid fishing activity at these islands. According to logbook records (June 2000 through 31 December 2002), closing the remainder of these islands to squid fishing from 01 February through 30 September would have minimal to no impact on the squid fishery. These logbooks indicate that only three occurrences of fishing activity with landings in the additional areas proposed for closing. These three landings took place in September 2001; approximately 97 tons were landed with a value of \$19,500. The value of these three landings was less than 0.1% of the total dollars paid ex-vessel during the 2001-2002 season. Further, it is important to remember that the southern California fishery peak months are from October through February, inclusive (fig. 3-7). From 1992 through 2001, 70% of southern California landings occurred in months not proposed for closure.

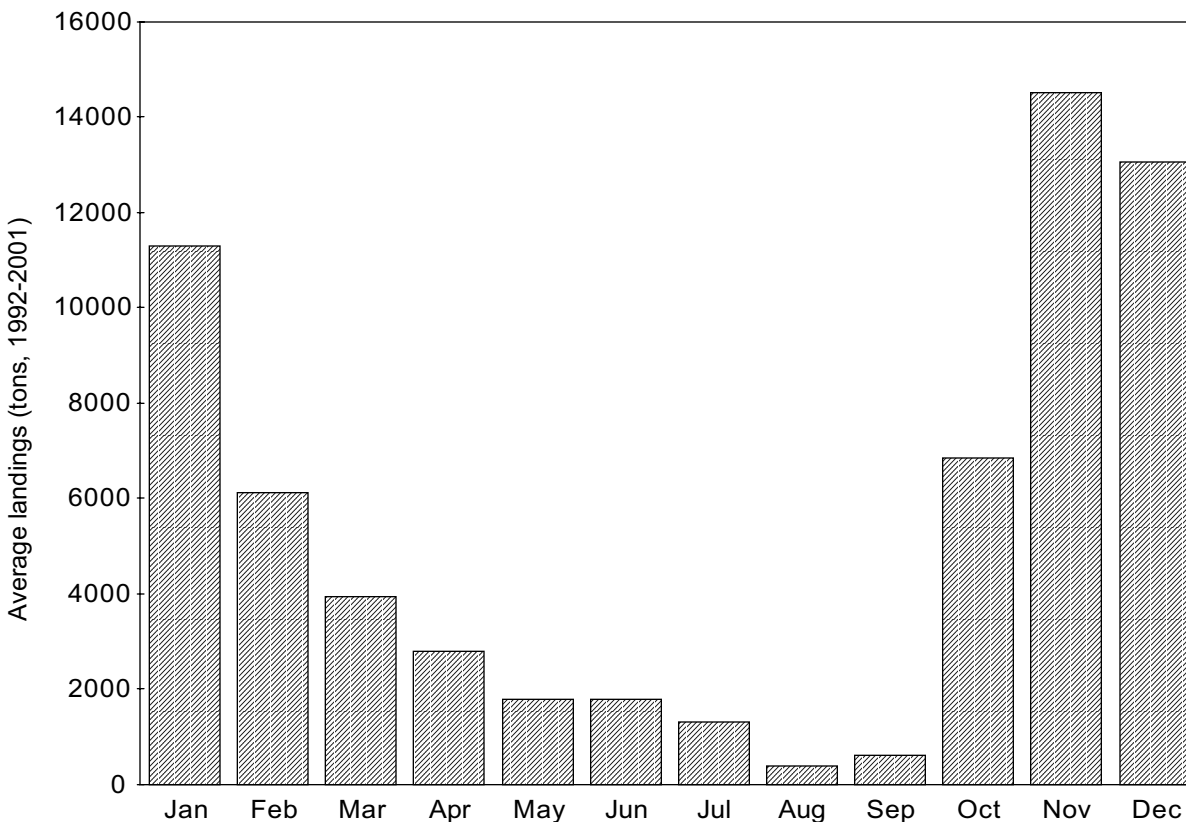


Figure 3-7. Graph showing average tons landed in southern California (south of Point Conception) by month from 1992 through 2001. Source: CDFG Landing Receipts.

Options P.1 and P.2 establish areas closed to fishing for market squid from 01 February through 30 September to protect nesting seabird species. Option P.1 creates a one nautical mile area around Anacapa, Santa Barbara and San Miguel islands where market squid fishing would be prohibited. Option P.2 establishes the same closed area for Anacapa and Santa Barbara islands only. Since no fishing activity has occurred in the proposed closed area for San Miguel within the last three years, it is assumed that the economic impacts from Option P.1 and P.2 are identical (less than 0.1% of total dollars paid ex-vessel).

Options P.3 and P.4 establish areas closed to the use of attracting lights for market squid fishing during the breeding season. This would allow daytime squid fishing to take place. Daytime fishing for market squid is becoming more commonplace (Table 3-28). The social and economic impacts of area closures for market squid fishing using attracting lights would probably be very similar to options P.1 and P.2 of total area closures for squid fishing, although they do not preclude the opportunity for daytime fishing. However, it is unlikely that many squid fishing vessels would travel to these islands to fish for squid without prior knowledge of squid aggregated in the area from light boats (O. Amoroso, pers. comm.).

Table 3-28. Number of daytime sets in southern California for the proposed closure months (01 February through 30 September) according to logbook data.			
Logbook timeframe	Day sets	Total sets	Percent day sets
6/30/00 to 12/31/00	0	201	0.0
1/01/01 to 12/31/01	130	1124	11.6
1/01/02 to 12/31/02	73	872	8.4

Logbooks indicate that the proposed areas for closure would impact that fishery less than 0.1%. Prohibiting fishing at these specified areas during the seabird breeding season does not preclude the fishery from fishing elsewhere, and assuming that the fishery would redirect their efforts when the areas are closed to fishing, Options P.1, P.2, P.3 and P.4 would not cause any significant change in net economic benefits and fishery community economic activities.

Option P.5) does not establish closed areas to protect seabirds. It is the status quo and would not cause any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

Option P.1 would establish area and time closures around San Miguel, Anacapa, and Santa Barbara islands from 01 February through 30 September of each year, from one nautical mile from the high water mark. Seabirds that forage in the waters and/or breed on these islands (see Table 3-26) would benefit because there would be decreased disturbance and interactions from squid vessels. Santa Barbara Island and Castle Rock (off San Miguel Island) are considered the especially important seabird nesting areas in the Southern California Bight in terms of numbers of species and numbers of breeding birds. In addition, Anacapa Island supports the largest breeding colony of California brown pelicans in the United States.

Thus, these area and time closures would include protection of breeding habitat for the listed California brown pelican, candidate species Xantus's murrelet and several SSCs (ashy storm-petrel, black storm-petrel, rhinoceros auklet, tufted puffin, and double-crested cormorant). Anacapa and Santa Barbara islands provide nesting habitat for all of the breeding California brown pelicans in the United States. Anacapa, Santa Barbara and San Miguel islands provide nesting habitat for about 81% of the Channel Island population and about 27% of the world's population of Xantus's murrelet, about 79% of the Channel Island population and about 32% of the world's population of ashy storm-petrel, all of the breeding black storm-petrels (Santa Barbara Island) in the United States, and the only colonies of tufted puffin (San Miguel Island) and rhinoceros auklet (San Miguel Island) in the Channel Islands (as well as habitat for other species listed in Table 3-22). The time closure from February through September would incorporate the breeding season for most seabird nesting species, during most years. The majority of the Channel Islands seabirds nest between March and August. Ashy storm-petrel nesting is protracted (starts in April) and the majority of chicks fledge in September and October. In some cases, brown pelicans and pelagic cormorants start nesting in January, and Xantus's murrelets may visit breeding sites starting in January.

Area closures out to one mile from February through September would eliminate most colony disturbances from the squid fishery at Anacapa, Santa Barbara, and San Miguel islands due to close vessel approach. The one-mile distance should also significantly reduce any potential impacts to these sensitive species from light pollution associated with the squid fishery and would reduce the cumulative impact of multiple light boats close to the islands.

However, closures around Anacapa, Santa Barbara, and San Miguel islands could result in increased fishing pressure around Santa Cruz Island and could negatively impact seabird species on this island. But, since the market squid fishing season typically occurs during the winter months, impacts to these other islands would only occur if fishing extended into the breeding season and squid were available in these areas.

Option P.2 differs from Option P.1 in that, seabird colonies at San Miguel Island would not receive protection. Prince Island is part of a marine protected area and closed to commercial fishing. Castle Rock and Prince Island off San Miguel Island are considered, along with Santa Barbara Island, to be the most important seabird nesting areas in the Southern California Bight, in terms of numbers of species and numbers of birds. The only nesting colonies in the Channel Islands of the SSC species rhinoceros auklet and tufted puffin are found on San Miguel Island. San Miguel and Santa Cruz islands provide important habitat for ashly storm-petrels (about 68% of the Channel Island population) and Xantus's murrelets (about 18% of the Channel Island population) and small numbers of both of these species have been found breeding on Santa Catalina and San Clemente islands. Squid fishing does currently occur off Santa Cruz Island but rarely occurs off San Miguel Island. But since the market squid fishing season typically occurs during the winter months, impacts to these other islands would only occur if fishing extended into the breeding season and squid were available in these areas.

Option P.3 offers seabird protection similar to Option P.1 although noise associated with squid fishing activities still has the potential to cause disturbances to breeding seabirds that require nesting and roosting sites free from human disturbance. Vessels attempting nighttime squid fishing without the use of attracting lights will require some level of artificial lighting to conduct their operations safely. We cannot rule out the possibility that this artificial night lighting associated with the squid purse seine fishery will result in disorientation of these species and collisions with vessels. Small amounts of light on vessels in the Channel Islands have been observed to cause disorientation in Xantus's murrelets and their chicks when they depart the colony.

Option P.4 (proposed option) offers seabird protection similar to Option P.2. These area and time closure will serve primarily to protect nesting brown pelicans, an endangered and fully protected species, from light disturbance associated with the squid fishery during the height of their breeding season. Under this option, noise associated with squid fishing activities still has the potential to cause disturbances to breeding seabirds that require nesting and roosting sites free from human disturbance

(see discussion above for Option P.3). Comparable to Option P.2, seabird colonies at San Miguel will not receive protection.

Option P.5 (status quo) would maintain current levels of potential impacts to seabirds breeding in the Channel Islands if the market squid fishery occurs close to breeding colonies during the breeding season.

Summary

Option P.1 would significantly reduce the impacts of light use associated with the squid fishery to nesting seabirds from the status quo (Option P.5). The other options, P.2, P.3 and P.4, in descending order, would offer a lesser degree of protection to nesting seabirds.

3.5.2.4 Department Preferred Option

The Department believes that, in addition to shielding and wattage restrictions (Option O.2), a more comprehensive approach is required to avoid impacting nesting seabirds and recommends establishing area and time closure areas (Option P.4) for fishing for squid using attracting lights around Anacapa and Santa Barbara islands.

The squid fishery is unique with its use of very bright attracting lights. Lights have been shown to disturb nesting seabirds. Further, continuous light levels are known to alter endocrine or hormonal levels in avian species. There are 12 species of seabirds that breed at the Anacapa and Santa Barbara islands, including one fully protected endangered species (California brown pelican), one candidate species (Xantus's murrelets) and three Species of Special Concern. In order to provide protection to these species as well as other seabirds associated with these islands, the Department recommends establishing area and time closure areas for fishing for squid using attracting lights around Anacapa and Santa Barbara islands from 1 February through 30 September. The area closure should be one nautical mile from the high water mark for these islands (Option P.4).

3.5.3 Option Q. Advisory Committee for Squid Fishery

3.5.3.1 Background

In 1997, as part of SB 364 (Sher), a Squid Fishery Advisory Committee, made up of resource stakeholders, and a Squid Research Scientific Committee, consisting of many of the world's leading squid fishery scientists, were established and utilized to advise the Director on recommendations for squid conservation and management and to provide input on the development of research protocols. These two committees, although separate, have functioned well in making recommendations to the director, especially with regard to the Status of the Market Squid Fishery with Recommendations for a Conservation and Management Plan report to the Legislature and this FMP.

Maintaining an advisory committee for market squid could assist the Department with evaluating the effectiveness of the proposed squid management. Commission guidelines require the periodic reexamination of established limited entry programs to determine if the program still meets the needs and objectives of the fleet and the State. An advisory committee will offer varied perspectives about the squid fishery. Their collaborative efforts to review resource management will be of assistance to the Department.

3.5.3.2 Advisory Committee Options

Option Q.1 (Proposed action): Establish one advisory committee for the squid fishery, which includes scientific, environmental and industry representatives.

Option Q.2 (Status quo): Maintain the two committee system: one from the scientific community and one from industry.

Option Q.3: Do not establish an advisory committee for the squid fishery.

3.5.3.3 Analysis of Option Q

Resource Impact

This option does not have any expected effects on the squid resource.

Social or Economic Impact

This option would not have any significant change in net economic benefits and fishery community economic activities.

Ecological Impacts

There are not any expected other ecological effects.

3.5.3.4 Department Preferred Option

The Department recommends establishing a single squid fishery advisory committee (Option Q.3) comprising industry, science, and environmental community members. The committee will assist the Department with the by providing recommendations regarding the effectiveness of proposed squid management.

3.6 General Fishery Management Plan Framework

An FMP framework is a multi-year management plan that describes the processes by which the fishery will be managed, including when, how, and within what limits regulatory changes will be made, and the ranges of the resulting impacts. Pre-season and in-season adjustments to regulations may be made without FMP amendment by implementing the procedures and provisions established in the FMP framework. Instead of providing a fixed set of management measures to implement at one point in time, the FMP framework establishes mechanisms to adjust the management of the

fishery to meet changing circumstances over a longer period. This may be accomplished through annual adjustments of seasons, quotas, etc., or through in-season adjustments needed in response to factors that cannot be precisely anticipated during a review process. Framework adjustments may be implemented more quickly than FMP amendments, allowing for more timely management response and providing for adaptive management.

Explicit instructions may be built into an FMP framework to lessen the risk that the FMP could be considered unreliable. However, highly specific guidelines may restrict the flexibility and adaptability of fishery management. Included in the FMP framework are limits and controls for how adjustments may be made. The FMP framework must fully specify the processes to be used in making adjustments including the determining activating mechanisms, procedures to be followed, and actions to be taken.

3.6.1 Framework Actions

There are four general types of actions that the Commission may take within the framework of the MSFMP: an FMP Amendment, Full Rulemaking Action, Notice Action, and Prescribed Action. Each type of action reflects a different degree of change in management—from changing a basic feature of the MSFMP itself to implementing a routine administrative matter, such as closing a fishery when its catch limitation is reached. Actions which reflect a higher degree of change require a greater level of scrutiny and analysis than do actions which are routine. Brief descriptions of each of these action types and the conditions for their use follow.

3.6.1.1 Plan Amendment

Framework management for FMPs is designed to be flexible, adaptable to a wide range of future conditions, and intended to function without the need for frequent amendment. However, significant social, economic, environmental or biological developments may create an unanticipated situation where the existing FMP does not adequately provide for future management of the fishery. Under such circumstances, the FMP would be amended to allow for efficient and responsive management of the fishery. Examples of actions that would require an FMP amendment include:

- Changes in applicable state or federal law;
- Changes to management objectives;
- A change in the definition of an overfished stock;
- Amendments to any process required by the FMP; or
- Revisions to any management measures that are fixed in the FMP.

An FMP amendment entails an extensive development and adoption process including input from advisory committees, public hearings, and an extended period for public comment and peer review as well as an environmental impact analysis (FGC §781.5) Once a draft plan amendment is adopted, it is implemented through the full rule-making process described in the next section.

3.6.1.2 Full Rulemaking Actions

If management measures will have a long-term effect, grant discretion in their application, and may have impacts that may not have been analyzed previously, a Full Rulemaking Action is required. This process, which must follow standard Administrative Procedures Act, normally requires at least three Commission meetings. Full Rulemaking may also be used to declare a management measure “routine.”

In the Full Rulemaking process, the Commission reviews the issues at a first meeting and authorizes its staff to publish notice of its intent to adopt regulations at a later meeting. This notice, which begins a 45-day period for public comment, includes specific documentation including an Informative Digest that summarizes existing law and the effect of the proposed action, the deadline for public comments, the time and place of any public hearings, and contact information for obtaining additional information. The notice is sent to persons on the Commission’s and Department’s active mailing lists and published in the California Regulatory Notice Register. At its second meeting, the Commission reviews the proposed measures and alternatives in detail and receives public comment. At the third meeting, the Commission hears public comment and adopts the final rules. Commission staff then submits the final rules to the Office of Administrative Law for procedural review prior to publication.

The Commission or the Department may refer an issue to a standing committee or appoint an ad-hoc advisory committee to conduct further analyses and/or develop recommendations. The composition of such committees will include the Department, other agencies with statutory responsibility for the issue, representatives from affected groups, and any other persons as chosen by the Commission.

Management measures recommended to address a resource conservation issue must be based upon the establishment of a point of concern and consistent with the specific procedures and criteria under the *Points of Concern Process*. Management measures recommended addressing social or economic issues must be consistent with the specific procedures and criteria described in *Social or Economic Process*.

This process does not diminish the authority of the Director or the Commission to take emergency regulatory action under FGC §7710, California Government Code §11346.1, or FGC §240.

3.6.1.3 Notice Actions

These include all management actions other than prescribed actions that are either non-discretionary or have probable impacts that have been previously analyzed. Before acting, the Commission will send a written notice describing the proposed action to people on the Commission’s and Department’s active mailing list and will provide a 15-day period for comment.

Such actions are temporary and will need periodic adjustment. They may be recommended at a single Commission meeting, although the Commission will provide as much advance information to the public as possible concerning the issues it will be considering. The primary examples are management actions defined in *Routine Management Measures* (see below). Previous analysis must have been specific as to how limits are best determined for routine management such that they can be acted upon at a single Commission meeting.

3.6.1.4 Prescribed Actions

Prescribed management actions may be automatically initiated by the Department Director or Commission without prior public notice, opportunity to comment, or a Commission meeting. These actions are ministerial and the impacts must have previously been taken into account. Examples include fishery, season, or gear type closures when a quota is attained.

3.6.2 Routine Management Measures

Routine management measures are those that the Commission determines are likely to be adjusted on an annual or more frequent basis. Measures are classified as routine by the Commission through either the full or the abbreviated (Notice or Prescribed Actions) rule making process. In order for a measure to be classified as routine, the Commission will determine that the measure is the type normally used to address the issue at hand and may require periodic adjustment to be effective.

As in the case of all proposed management measures, prior to initial implementation as routine measures, the Commission will analyze the need for the measures, their impacts, and the rationale for their use. Once a management measure has been classified as routine through one of the two rule making procedures outlined above, it may be modified thereafter through the single meeting notice procedure if: (1) the modification is proposed for the same purpose as the original measure, and (2) the impacts of the modification are within the scope of the impacts analyzed when the measure was originally classified as routine. The analysis of impacts need not be repeated when the measure is subsequently modified if the Commission determines that they do not differ substantially from those contained in the original analysis. The Commission may also recommend removing a routine classification.

3.6.3 Market Squid FMP Framework

The FMP framework for market squid resource management is composed of several elements, which taken individually or together, will allow the Commission to react quickly to changes in the market squid population off California without the need for a full plan amendment. Management measures are normally imposed, adjusted, or removed at the beginning of the fishing season but may, if the Commission deems necessary, be imposed, adjusted, or removed at any time during the year. Management measures may be imposed for resource conservation, social or economic

reasons consistent with the criteria, procedures, goals, and objectives set forth in the MSFMP.

The MSFMP framework provides the Commission specific guidelines for making management decisions. However, these guidelines are intended to be flexible and allow for other management strategies that would effectively achieve the goals and objectives of this FMP and MLMA.

The MSFMP is consistent with federal management for this species. The federal CPS FMP Amendment 8 identifies market squid as a “monitored-only” species and delegates management to the State of California.

3.6.4 Points of Concern Process

The points of concern process is one of the tools the Commission has for exercising its resource stewardship responsibilities for market squid. The process is intended to foster a continuous and vigilant review of the market squid population and fishery to prevent overfishing or other resource damage. The Department will monitor the fishery throughout the year, taking into account any new information to determine whether a resource conservation issue exists that requires a management response. The points of concern criteria are intended to assist the Commission in determining when a focused review is warranted, and which may result in the need to recommend management measures to address the issue.

This FMP framework provides the authority to act based solely on the points of concern. Thus, the Commission may act quickly and directly to address a resource conservation issue. In conducting its analysis, the Department will utilize the most current catch, effort, abundance and other relevant data. In the course of the continuing review, a “point of concern” occurs when any one or more of the following is found or expected:

- Catch is projected to significantly exceed the current seasonal catch limitation;
- Any adverse or significant change in the biological characteristics of the market squid (age composition, size composition, age at maturity, or recruitment) is discovered;
- An overfished condition exists or is imminent (egg escapement method threshold not realized in two consecutive years);
- Any adverse or significant change in the availability of market squid forage or in the status of a dependent species is discovered;
- An error in data or a change to an indicator of stock status is detected that requires an adjustment to fishery control rules to ensure sustainable resource management.

Once a point of concern is identified, the Department will undertake several actions with regard to the Commission. The Department will evaluate current data to determine if a resource conservation issue exists and will provide its findings in writing. If the Department determines a resource conservation issue exists, it will provide its recommendation, rationale, and analysis for the appropriate management measures

that will address the issue. In developing its recommendation for management action, the Department will recommend alternatives from one or more of the most commonly used management measures, or other necessary measures, to address resource conservation issues.

After receiving the Department's report and recommendations, the Commission will take public testimony and, if appropriate, will implement management measures accompanied by supporting rationale and analysis of impacts. The Commission's analysis will include a description of (a) how the action will address the resource conservation issue consistent with the objectives of the MSFMP; (b) likely impacts on other management measures and other fisheries; and (c) economic impacts, particularly the cost to the commercial segments of the fishing industry. Nothing in this section prevents the Director or the Commission from exercising the authority to take emergency action as specified in the Fish and Game Code.

3.6.5 Social or Economic Process

Changes may occasionally occur that require the Commission to consider management actions to address certain social or economic conditions in the market squid fishery. Restricted access programs, landing limits based on market quality and timing, safety measures, and prevention of gear conflicts are only a few examples of possible management issues with a social or economic basis. In general, there may be any number of situations where the Commission determines that management measures are necessary to achieve the stated social and/or economic objectives of the MSFMP.

The Commission may evaluate current information and issues to determine if social or economic factors warrant imposition of management measures to achieve the Commission's established management objectives. Actions that are permitted under this FMP framework include all of the categories of actions authorized under the points of concern FMP framework with the addition of direct resource allocation and access limitation measures. If the Commission concludes that a management action is necessary to address a social or economic issue, the Commission or the Department will document in a report the foundation in support of that conclusion. The report will include the proposed management measure, a description of other viable alternatives considered, and an analysis that addresses the following criteria: (a) how the action is expected to promote achievement of the goals and objectives of the MSFMP; (b) likely impacts on other management measures and other fisheries; (c) biological impacts; (d) economic impacts, including the cost to the fishing industry; and (e) how the action is expected to accomplish at least one of the following:

- Enable a quota, fishery control rule, or allocation to be achieved;
- Avoid exceeding a quota, fishery control rule, or allocation;
- Increase sustainable landings;
- Reduce discards;
- Reduce gear conflicts, or conflicts between competing user groups;
- Extend fishing and marketing opportunities as long as practicable during the fishing year;

- Maintain or improve product volume and flow to the consumer or user;
- Increase economic yield;
- Maintain or improve the safety of fishing operations;
- Increase fishing efficiency;
- Maintain or improve product quality;
- Maintain or improve data collection, including means for verification;
- Maintain or improve monitoring and enforcement; or
- Any other measurable benefit to the fishery.

The Commission, following review of the report, public comment and other relevant information, may implement management measures accompanied by relevant background data, information and public comment.

If conditions warrant, the Commission may designate a management measure as a routine management measure to address social and economic issues if the criteria and procedures in herein are followed.

Fishery control rules implemented through this FMP framework may be modified in season to reflect technical corrections. In contrast, fishery control rules may be imposed at any time of year for resource conservation reasons under the points of concern mechanism. Nothing in this FMP framework chapter is intended to preclude or limit the Commission's access to the social and economic process.

3.6.6 Trigger Mechanisms

It is vital to have ways that measure or gauge the success of the management measures implemented by the Commission. Measurable long term fishery-dependent and fishery-independent data such as catch trends, recruitment patterns, and forage abundance indices should be used to monitor the effectiveness of current management measures. For example, continual decreases in catch and or rate of egg escapement will alert the Department to potential problems within the market squid population. The Department will determine appropriate trigger mechanisms for the market squid population and will use them to provide management recommendations to the Commission. In turn, the Commission could implement needed management measures in a timely manner through the *Points of Concern Process*.

On a continuous basis, the Department will review landings for which fishery control rules (e.g., catch limitations and the egg escapement management) have been implemented, and it will make projections of the landings at a minimum of once a year. If the threshold for egg escapement drops below a minimum threshold two years in a row, or If it becomes apparent that landings are substantially different than anticipated and that the current routine management measures will not achieve the management objectives, then the Department may recommend to the Commission adjustments to those measures. Such adjustments may be implemented through the single meeting notice procedure.

3.6.7 Management Alternatives

In addition to the framework procedures described above, initial management alternatives are proposed for implementation upon approval of the MSFMP. If adopted by the Commission and implemented by the Department, these alternatives would become regulations affecting the market squid fishery. They may be modified in the future, or new regulations may be implemented, using the framework procedures in the MSFMP.